

2207

09/936,148

=> d que 128

L2 13396 SEA FILE=HCAPLUS ABB=ON PLU=ON ELECTROLYT?(2A)MEMBRAN?  
L3 5291 SEA FILE=HCAPLUS ABB=ON PLU=ON "FUEL CELL ELECTROLYTES"+P  
FT,NT,OLD,NEW/CT  
L4 1897 SEA FILE=HCAPLUS ABB=ON PLU=ON L2 AND L3  
L5 QUE ABB=ON PLU=ON PORE# OR POROUS# OR PERMEABL? OR HOL  
E# OR SPONG# OR ABSORP? OR POROS#  
L6 363 SEA FILE=HCAPLUS ABB=ON PLU=ON L4 AND L5  
L7 73 SEA FILE=HCAPLUS ABB=ON PLU=ON L6 AND CONDUCT? (2A) (POLYM  
ER? OR GRAFT POLYMER? OR COPOLYMER? OR CO(A) POLYMER? OR  
BLOCK POLYMER? OR BLOCKPOLYMER? OR GRAFTPOLYMER?)  
L8 51 SEA FILE=HCAPLUS ABB=ON PLU=ON L7 AND PROTON?  
L9 34 SEA FILE=HCAPLUS ABB=ON PLU=ON L8 AND DEV/RL  
L10 8 SEA FILE=HCAPLUS ABB=ON PLU=ON L9 AND (1840-2000)/PRY,AY,  
PY  
L11 16 SEA FILE=HCAPLUS ABB=ON PLU=ON L7 AND (1840-2000)/PRY,AY,  
PY  
L12 16 SEA FILE=HCAPLUS ABB=ON PLU=ON L10 OR L11  
L14 17960 SEA FILE=HCAPLUS ABB=ON PLU=ON L5(3A)SUBSTRAT?  
L15 85 SEA FILE=HCAPLUS ABB=ON PLU=ON L14 AND L4  
L16 QUE ABB=ON PLU=ON CONDUCT? (2A) (POLYMER? OR GRAFT POLY  
MER? OR COPOLYMER? OR CO(A) POLYMER? OR BLOCK POLYMER? OR  
BLOCKPOLYMER? OR GRAFTPOLYMER?)  
L17 28 SEA FILE=HCAPLUS ABB=ON PLU=ON L15 AND L16  
L18 6 SEA FILE=HCAPLUS ABB=ON PLU=ON L17 AND (1840-2000)/PRY,A  
Y,PY  
L19 16 SEA FILE=HCAPLUS ABB=ON PLU=ON L12 OR L18  
L20 42 SEA FILE=HCAPLUS ABB=ON PLU=ON L15 AND PROTON#  
L21 5 SEA FILE=HCAPLUS ABB=ON PLU=ON L20 AND (1840-2000)/PRY,A  
Y,PY  
L22 17 SEA FILE=HCAPLUS ABB=ON PLU=ON L19 OR L21  
L23 2552 SEA FILE=HCAPLUS ABB=ON PLU=ON L2 AND CATHOD# AND ANOD#  
L24 44 SEA FILE=HCAPLUS ABB=ON PLU=ON L23 AND L5(2A) (SUBSTRAT?  
OR BASE# OR SURFAC? OR SUBSTRUCT? OR UNDERSTRUCT? OR  
UNDERLAY? OR FOUNDATION? OR PANE?)  
L25 24 SEA FILE=HCAPLUS ABB=ON PLU=ON L24 AND ?POLYMER?  
L27 7 SEA FILE=HCAPLUS ABB=ON PLU=ON L25 AND (1840-2000)/PRY,A  
Y,PY  
L28 23 SEA FILE=HCAPLUS ABB=ON PLU=ON L22 OR L27

=> d que 153

L2 13396 SEA FILE=HCAPLUS ABB=ON PLU=ON ELECTROLYT?(2A)MEMBRAN?  
L5 QUE ABB=ON PLU=ON PORE# OR POROUS# OR PERMEABL? OR HOL  
E# OR SPONG# OR ABSORP? OR POROS#  
L14 17960 SEA FILE=HCAPLUS ABB=ON PLU=ON L5(3A)SUBSTRAT?  
L23 2552 SEA FILE=HCAPLUS ABB=ON PLU=ON L2 AND CATHOD# AND ANOD#  
L29 4123 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBRAN?  
L30 62 SEA FILE=WPIX ABB=ON PLU=ON L23 AND L5(2A) (SUBSTRAT? OR  
BASE# OR SURFAC? OR SUBSTRUCT? OR UNDERSTRUCT? OR UNDERLAY?  
OR FOUNDATION? OR PANE?)  
L31 62 SEA FILE=WPIX ABB=ON PLU=ON L30 AND L29  
L32 16308 SEA FILE=WPIX ABB=ON PLU=ON CONDUCT? (2A) (POLYMER? OR  
GRAFT POLYMER? OR COPOLYMER? OR CO(A) POLYMER? OR BLOCK  
POLYMER? OR BLOCKPOLYMER? OR GRAFTPOLYMER?)  
L33 5 SEA FILE=WPIX ABB=ON PLU=ON L32 AND L31  
L34 1303 SEA FILE=WPIX ABB=ON PLU=ON L29 AND L5  
L35 117 SEA FILE=WPIX ABB=ON PLU=ON L34 AND L32  
L36 50 SEA FILE=WPIX ABB=ON PLU=ON L35 AND (CATHOD# OR ANOD# OR

ELCTROD#)

L37 47 SEA FILE=WPIX ABB=ON PLU=ON L36 AND FUEL CELL#

L38 QUE ABB=ON PLU=ON L5(2A)(SUBSTRAT? OR BASE# OR SURFAC?  
OR SUBSTRUCT? OR UNDERSTRUCT? OR UNDERLAY? OR FOUNDATION  
? OR PANE?)

L39 5 SEA FILE=WPIX ABB=ON PLU=ON L37 AND L38

L40 31 SEA FILE=WPIX ABB=ON PLU=ON L37 AND PROTON?

L41 1 SEA FILE=WPIX ABB=ON PLU=ON L40 AND HEAT(A)RESIST?

L42 1 SEA FILE=WPIX ABB=ON PLU=ON L40 AND INORGANIC SUBS?

L43 0 SEA FILE=WPIX ABB=ON PLU=ON L40 AND GRAFT POLYMER?

L44 34 SEA FILE=WPIX ABB=ON PLU=ON L33 OR L39 OR L40 OR (L41 OR  
L42 OR L43)

L45 7 SEA FILE=WPIX ABB=ON PLU=ON L44 AND (PY<2000 OR AY<2000  
OR PRY<2000)

L46 502 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBER?

L47 4 SEA FILE=WPIX ABB=ON PLU=ON L46 AND L14

L48 2 SEA FILE=WPIX ABB=ON PLU=ON L47 AND (PY<2000 OR AY<2000  
OR PRY<2000)

L49 9 SEA FILE=WPIX ABB=ON PLU=ON L45 OR L48

L50 341 SEA FILE=WPIX ABB=ON PLU=ON (L29 OR L46) AND L32

L51 19 SEA FILE=WPIX ABB=ON PLU=ON L50 AND L38

L52 7 SEA FILE=WPIX ABB=ON PLU=ON L51 AND (PY<2000 OR AY<2000  
OR PRY<2000)

L53 15 SEA FILE=WPIX ABB=ON PLU=ON L52 OR L49

=> d que 160

L5 QUE ABB=ON PLU=ON PORE# OR POROUS# OR PERMEABL? OR HOL  
E# OR SPONG# OR ABSORP? OR POROS#

L16 QUE ABB=ON PLU=ON CONDUCT? (2A)(POLYMER? OR GRAFT POLY  
MER? OR COPOLYMER? OR CO(A)POLYMER? OR BLOCK POLYMER? OR  
BLOCKPOLYMER? OR GRAFTPOLYMER?)

L29 4123 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBRAN?

L32 16308 SEA FILE=WPIX ABB=ON PLU=ON CONDUCT? (2A)(POLYMER? OR  
GRAFT POLYMER? OR COPOLYMER? OR CO(A)POLYMER? OR BLOCK  
POLYMER? OR BLOCKPOLYMER? OR GRAFTPOLYMER?)

L38 QUE ABB=ON PLU=ON L5(2A)(SUBSTRAT? OR BASE# OR SURFAC?  
OR SUBSTRUCT? OR UNDERSTRUCT? OR UNDERLAY? OR FOUNDATION  
? OR PANE?)

L46 502 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBER?

L54 144 SEA FILE=COMPENDEX ABB=ON PLU=ON (L29 OR L46) AND L32

L55 5 SEA FILE=COMPENDEX ABB=ON PLU=ON L54 AND L38

L56 0 SEA FILE=COMPENDEX ABB=ON PLU=ON L55 AND (PY<2000 OR  
AY<2000 OR PRY<2000)

L57 23 SEA FILE=COMPENDEX ABB=ON PLU=ON L54 AND L5

L58 23 SEA FILE=COMPENDEX ABB=ON PLU=ON L57 AND L16

L59 4 SEA FILE=COMPENDEX ABB=ON PLU=ON L58 AND (PY<2000 OR  
AY<2000 OR PRY<2000)

L60 4 SEA FILE=COMPENDEX ABB=ON PLU=ON L56 OR L59

=> d que 165

L5 QUE ABB=ON PLU=ON PORE# OR POROUS# OR PERMEABL? OR HOL  
E# OR SPONG# OR ABSORP? OR POROS#

L29 4123 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBRAN?

L32 16308 SEA FILE=WPIX ABB=ON PLU=ON CONDUCT? (2A)(POLYMER? OR  
GRAFT POLYMER? OR COPOLYMER? OR CO(A)POLYMER? OR BLOCK  
POLYMER? OR BLOCKPOLYMER? OR GRAFTPOLYMER?)

L38 QUE ABB=ON PLU=ON L5(2A)(SUBSTRAT? OR BASE# OR SURFAC?  
OR SUBSTRUCT? OR UNDERSTRUCT? OR UNDERLAY? OR FOUNDATION

? OR PANE?)

L46 502 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBER?

L54 144 SEA FILE=COMPENDEX ABB=ON PLU=ON (L29 OR L46) AND L32

L61 4 SEA FILE=PASCAL ABB=ON PLU=ON L54 AND L38

L62 14 SEA FILE=PASCAL ABB=ON PLU=ON L54 AND L5

L63 6 SEA FILE=PASCAL ABB=ON PLU=ON (L61 OR L62) AND (PY<2000 OR AY<2000 OR PRY<2000)

L64 2 SEA FILE=PASCAL ABB=ON PLU=ON L63 AND PROTON?

L65 6 SEA FILE=PASCAL ABB=ON PLU=ON L63 OR L64

=> d que 174

L5 QUE ABB=ON PLU=ON PORE# OR POROUS# OR PERMEABL? OR HOL E# OR SPONG# OR ABSORP? OR POROS#

L29 4123 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBRAN?

L32 16308 SEA FILE=WPIX ABB=ON PLU=ON CONDUCT? (2A)(POLYMER? OR GRAFT POLYMER? OR COPOLYMER? OR CO(A)POLYMER? OR BLOCK POLYMER? OR BLOCKPOLYMER? OR GRAFTPOLYMER?)

L38 QUE ABB=ON PLU=ON L5(2A)(SUBSTRAT? OR BASE# OR SURFAC? OR SUBSTRUCT? OR UNDERSTRUCT? OR UNDERLAY? OR FOUNDATION ? OR PANE?)

L46 502 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBER?

L54 144 SEA FILE=COMPENDEX ABB=ON PLU=ON (L29 OR L46) AND L32

L68 13 SEA FILE=JAPIO ABB=ON PLU=ON L54 AND L38

L69 34 SEA FILE=JAPIO ABB=ON PLU=ON L54 AND L5

L70 34 SEA FILE=JAPIO ABB=ON PLU=ON L68 OR L69

L71 7 SEA FILE=JAPIO ABB=ON PLU=ON L70 AND (CATHOD# OR ANOD# OR ELCTROD#)

L72 34 SEA FILE=JAPIO ABB=ON PLU=ON L70 OR L71 AND (PY<2000 OR AY<2000 OR PRY<2000)

L73 23 SEA FILE=JAPIO ABB=ON PLU=ON L72 AND PROTON?

L74 21 SEA FILE=JAPIO ABB=ON PLU=ON L73 AND FUEL CELL#

=> d que 178

L5 QUE ABB=ON PLU=ON PORE# OR POROUS# OR PERMEABL? OR HOL E# OR SPONG# OR ABSORP? OR POROS#

L29 4123 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBRAN?

L32 16308 SEA FILE=WPIX ABB=ON PLU=ON CONDUCT? (2A)(POLYMER? OR GRAFT POLYMER? OR COPOLYMER? OR CO(A)POLYMER? OR BLOCK POLYMER? OR BLOCKPOLYMER? OR GRAFTPOLYMER?)

L38 QUE ABB=ON PLU=ON L5(2A)(SUBSTRAT? OR BASE# OR SURFAC? OR SUBSTRUCT? OR UNDERSTRUCT? OR UNDERLAY? OR FOUNDATION ? OR PANE?)

L46 502 SEA FILE=WPIX ABB=ON PLU=ON ELECTROLYT?(2A)MEMBER?

L54 144 SEA FILE=COMPENDEX ABB=ON PLU=ON (L29 OR L46) AND L32

L75 1 SEA FILE=RAPRA ABB=ON PLU=ON L54 AND L38

L76 17 SEA FILE=RAPRA ABB=ON PLU=ON L54 AND L5

L77 17 SEA FILE=RAPRA ABB=ON PLU=ON L75 OR L76

L78 2 SEA FILE=RAPRA ABB=ON PLU=ON L77 AND (PY<2000 OR AY<2000 OR PRY<2000)

=> dup rem 128 153 160 165 174 178

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PROCESSING COMPLETED FOR L28  
 PROCESSING COMPLETED FOR L53  
 PROCESSING COMPLETED FOR L60  
 PROCESSING COMPLETED FOR L65  
 PROCESSING COMPLETED FOR L74  
 PROCESSING COMPLETED FOR L78  
 L79 67 DUP REM L28 L53 L60 L65 L74 L78 (4 DUPLICATES REMOVED)  
 ANSWERS '1-23' FROM FILE HCAPLUS  
 ANSWERS '24-36' FROM FILE WPIX  
 ANSWERS '37-40' FROM FILE COMPENDEX  
 ANSWERS '41-44' FROM FILE PASCAL  
 ANSWERS '45-65' FROM FILE JAPIO  
 ANSWERS '66-67' FROM FILE RAPRA

=> d 1-23 ibib ed abs hitind

L79 ANSWER 1 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN DUPLICATE 1  
 ACCESSION NUMBER: 2005:123117 HCAPLUS Full-text  
 DOCUMENT NUMBER: 142:222572  
 TITLE: Composite solid polymer **electrolyte**  
**membranes** for use in electrochemical  
 applications  
 INVENTOR(S): Ofer, David; Nair, Bindu R.; Stoler, Emily J.;  
 Kovar, Robert F.  
 PATENT ASSIGNEE(S): Foster-Miller Inc., USA  
 SOURCE: U.S. Pat. Appl. Publ., 32 pp., Cont.-in-part of  
 U.S. Ser. No. 750,402.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 4  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 2005031925	A1	20050210	US 2004-851478	20040522
			<--	
US 2002045085	A1	20020418	US 2000-750402	20001228
			<--	
US 7052793	B2	20060530		

09/936,148

WO 2006073474      A2      20060713      WO 2005-US18105      20050520

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA,  
CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM,  
KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN,  
MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU,  
SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA,  
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU,  
IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF,  
BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG,  
BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW,  
AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

PRIORITY APPLN. INFO.:

US 1999-261397      A3 19990303

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US 2000-750402      A2 20001228

<--

US 1997-57233P      P 19970829

<--

US 1999-261349      A3 19990303

<--

US 2004-851478      A 20040522

ED Entered STN: 13 Feb 2005

AB The present invention relates to composite solid polymer **electrolyte membranes** (SPEMs) which include a **porous polymer substrate** interpenetrated with a water soluble ion-conducting material. SPEMs of the present invention are useful in electrochem. applications, including fuel cells and electrodialysis.

IC ICM H01M008-10

ICS H01M008-00; H01M006-18

INCL 429030000; 429033000; 429314000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 72

ST polymer **electrolyte membrane** use electrochem  
application; fuel cell polymer **electrolyte membrane**  
; electrodialysis polymer **electrolyte membrane**

IT Polyamide fibers, uses  
(aramid; composite solid polymer **electrolyte**  
**membranes** for use in electrochem. applications)

IT Polymers, uses  
(aromatic, ion **conductive**; composite solid **polymer**  
**electrolyte membranes** for use in electrochem.  
applications)

IT Polyamides, uses  
Polyketones  
Polysulfones, uses  
(aromatic, sulfonated; composite solid polymer **electrolyte**  
**membranes** for use in electrochem. applications)

IT Polyimides, uses  
(carboxylated and phosphonated and sulfonated; composite solid  
polymer **electrolyte membranes** for use in  
electrochem. applications)

IT Electrochemical cells  
**Fuel cell electrolytes**  
Polymer electrolytes  
Sulfonation  
(composite solid polymer **electrolyte membranes**  
for use in electrochem. applications)

IT Polybenzoxazoles  
(composite solid polymer **electrolyte membranes**

- for use in electrochem. applications)
- IT Polybenzimidazoles  
(composite solid polymer **electrolyte membranes**  
for use in electrochem. applications)
- IT Polybenzothiazoles  
(composite solid polymer **electrolyte membranes**  
for use in electrochem. applications)
- IT Dialyzers  
(electrodialyzers, membranes; composite solid polymer  
**electrolyte membranes** for use in electrochem.  
applications)
- IT Polyoxyalkylenes, uses  
(fluorine- and sulfo-containing, ionomers; composite solid polymer  
**electrolyte membranes** for use in electrochem.  
applications)
- IT Ionomers  
(fluoropolymers; composite solid polymer **electrolyte**  
**membranes** for use in electrochem. applications)
- IT Fluoropolymers, uses  
(ionomers; composite solid polymer **electrolyte**  
**membranes** for use in electrochem. applications)
- IT Liquid crystals, polymeric  
(lyotropic; composite solid polymer **electrolyte**  
**membranes** for use in electrochem. applications)
- IT Ionomers  
(partially fluorinated; composite solid polymer **electrolyte**  
**membranes** for use in electrochem. applications)
- IT Synthetic polymeric fibers, uses  
(polybenzazole, sulfonated; composite solid polymer  
**electrolyte membranes** for use in electrochem.  
applications)
- IT Polysulfones, uses  
(polyether-, aromatic, sulfonated; composite solid polymer  
**electrolyte membranes** for use in electrochem.  
applications)
- IT Polyketones  
Polysulfones, uses  
(polyether-, sulfonated; composite solid polymer  
**electrolyte membranes** for use in electrochem.  
applications)
- IT Polyethers, uses  
(polyketone-, sulfonated; composite solid polymer  
**electrolyte membranes** for use in electrochem.  
applications)
- IT Sulfonic acids, uses  
(polymers, fluoro; composite solid polymer **electrolyte**  
**membranes** for use in electrochem. applications)
- IT Fluoropolymers, uses  
(polyoxyalkylene-, sulfo-containing, ionomers; composite solid polymer  
**electrolyte membranes** for use in electrochem.  
applications)
- IT Ionomers  
(polyoxyalkylenes, fluorine- and sulfo-containing; composite solid  
polymer **electrolyte membranes** for use in  
electrochem. applications)
- IT Polysulfones, uses  
(polyphenyl-, sulfonated; composite solid polymer  
**electrolyte membranes** for use in electrochem.  
applications)
- IT Polyquinoxalines

- (polyphenylquinoxalines, sulfonated; composite solid polymer **electrolyte membranes** for use in electrochem. applications)
- IT Polyethers, uses  
(polysulfone-, aromatic, sulfonated; composite solid polymer **electrolyte membranes** for use in electrochem. applications)
- IT Polyethers, uses  
Polyphenyls  
(polysulfone-, sulfonated; composite solid polymer **electrolyte membranes** for use in electrochem. applications)
- IT Polymers, uses  
(sulfo-containing, fluoro; composite solid polymer **electrolyte membranes** for use in electrochem. applications)
- IT Polyoxyphenylenes  
Polysulfones, uses  
(sulfonated; composite solid polymer **electrolyte membranes** for use in electrochem. applications)
- IT 9003-01-4, Polyacrylic acid 26101-52-0, Polyvinyl sulfonic acid 27754-99-0, Polyvinyl phosphonic acid 50851-57-5, Polystyrene sulfonic acid 63496-24-2, Nafion EW 1100  
(composite solid polymer **electrolyte membranes** for use in electrochem. applications)
- IT 686768-99-0P 843614-17-5P  
(composite solid polymer **electrolyte membranes** for use in electrochem. applications)
- IT 3177-22-8P 25135-51-7P 25667-42-9DP, Ultrason E, sulfonated 154281-38-6DP, Radel R, sulfonated 220998-11-8P  
(composite solid polymer **electrolyte membranes** for use in electrochem. applications)
- IT 25035-37-4, Poly(1,4-phenylene terephthalamide)  
(composite solid polymer **electrolyte membranes** for use in electrochem. applications)

L79 ANSWER 2 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN DUPLICATE 2

ACCESSION NUMBER: 2000:646292 HCAPLUS Full-text

DOCUMENT NUMBER: 133:225582

TITLE: **Electrolyte membranes** for fuel cells, their manufacture, fuel cells, and manufacture of the fuel cells

INVENTOR(S): Yamaguchi, Takeo; Nakao, Shinichi

PATENT ASSIGNEE(S): Center for Advanced Science and Technology Incubation, Ltd., Japan

SOURCE: PCT Int. Appl., 20 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2000054351	A1	20000914	WO 2000-JP1370	20000307

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W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ,

09/936,148

VN, YU, ZA, ZW  
RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,  
DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF,  
BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG  
AU 2000028310 A 20000928 AU 2000-28310 20000307

<--

EP 1202365 A1 20020502 EP 2000-906746 20000307

<--

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL

PRIORITY APPLN. INFO.: JP 1999-60817 A 19990308

<--

WO 2000-JP1370 W 20000307

<--

ED Entered STN: 15 Sep 2000

AB The **electrolyte membranes** have a **proton conductive polymer** filled in the **pores** fo a **porous substrate** not swellable by MeOH or H2O. The substrate is an inorg. material or a heat resistant polymer. The membranes are prepared by irradiating the **porous substrate** with an energy beam and contacting the substrate with a monomer to form the polymer. The fuel cells have the **electrolyte membrane** formed on the catalyst layers of their cathodes or anodes, and are prepared by applying sol on an electrode, converting the sol layer to a **porous substrate** film, filling the **pores** in the film with the **proton conductive polymer**, and laminating with the other electrode.

IC ICM H01M008-02

ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell **proton conductive polymer**

electrolyte; polymer electrolyte **porous substrate**  
fuel cell

IT Plasma

(argon plasma in manufacture of polymer **electrolyte membranes** containing heat resistant **porous substrates** for fuel cells)

IT **Fuel cell electrolytes**

(manufacture of polymer **electrolyte membranes** containing heat resistant **porous substrates** for fuel cells)

IT Fluoropolymers, uses

(manufacture of polymer **electrolyte membranes** containing heat resistant **porous substrates** for fuel cells)

IT 9002-84-0, Teflon 9003-01-4, Polyacrylic acid

(manufacture of polymer **electrolyte membranes** containing heat resistant **porous substrates** for fuel cells)

IT 7440-37-1, Argon, uses

(manufacture of polymer **electrolyte membranes** containing heat resistant **porous substrates** for fuel cells)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN THE  
RE FORMAT

L79 ANSWER 3 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2002:172319 HCAPLUS Full-text

DOCUMENT NUMBER: 136:203103

TITLE: Fuel cell unit and its manufacture

INVENTOR(S): Chikano, Yoshito; Yonezu, Ikuo; Akiyama, Yukinori;  
Matsubayashi, Takaaki; Taniguchi, Shunsuke



PATENT ASSIGNEE(S): Sanyo Electric Co., Ltd., Japan  
 SOURCE: PCT Int. Appl., 52 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002019454	A1	20020307	WO 2001-JP7300	20010827

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W: CN, KR, US

RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
NL, PT, SE, TR

JP 2002075406	A	20020315	JP 2000-261919	20000830
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JP 2002313371	A	20021025	JP 2000-373318	20001207
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EP 1326296	A1	20030709	EP 2001-958501	20010827
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R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT, IE, FI, CY, TR

US 2002150811	A1	20021017	US 2002-110232	20020423
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PRIORITY APPLN. INFO.:

JP 2000-261919 A 20000830

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JP 2000-373318 A 20001207

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WO 2001-JP7300 W 20010827

ED Entered STN: 08 Mar 2002

AB The fuel cell unit has an **electrolyte membrane** stacked successively with a catalyst layer and a gas diffusion layer on both sides, where the **electrolyte membrane** has a H<sup>+</sup> conductive gel electrolyte retained in a porous sheet, and the catalyst layers and/or gas diffusion layers have pores smaller than those on the **electrolyte membrane**. The gel **electrolyte membrane** is prepared by spreading on a **porous substrate**. The fuel cell unit is prepared by pouring a solution containing a H<sup>+</sup> conducting material on a catalyst layer, stacked on top of a gas diffusion layer, to form a gel **electrolyte membrane**, and stacking a catalyst layer and a gas diffusion layer successively on the gel **electrolyte membrane**.

IC ICM H01M008-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT **Fuel cell electrolytes**(Bronsted acid modified **proton** conducting gel electrolyte  
in porous sheets for fuel cells)

IT Synthetic fibers

(ceramic; structure and manufacture of fuel cells with Bronsted acid  
modified **proton** conducting gel electrolyte in ceramic  
fiber sheets)

IT Ceramics

(fibers; structure and manufacture of fuel cells with Bronsted acid  
modified **proton** conducting gel electrolyte in ceramic  
fiber sheets)

IT Fuel cells

(structure and manufacture of **proton** conducting gel  
electrolyte fuel cells)

IT Carbonaceous materials (technological products)

Fluoropolymers, uses

(structure and manufacture of **proton** conducting gel electrolyte fuel cells containing hydrophobic carbonaceous electrodes)

IT 1344-28-1, Alumina, uses  
(structure and manufacture of fuel cells with Bronsted acid modified alumina **proton** conducting gel electrolyte in ceramic fiber sheets)

IT 7601-90-3, Perchloric acid, uses 7664-38-2, Phosphoric acid, uses  
10043-35-3, Boric acid, uses  
(structure and manufacture of fuel cells with Bronsted acid modified **proton** conducting gel electrolyte in ceramic fiber sheets)

IT 7631-86-9, Silica, uses  
(structure and manufacture of fuel cells with Bronsted acid modified silica **proton** conducting gel electrolyte in ceramic fiber sheets)

IT 13463-67-7, Titania, uses  
(structure and manufacture of fuel cells with Bronsted acid modified titania **proton** conducting gel electrolyte in ceramic fiber sheets)

IT 1314-62-1, Vanadium pentoxide, uses  
(structure and manufacture of fuel cells with Bronsted acid modified vanadium oxide **proton** conducting gel electrolyte in ceramic fiber sheets)

IT 1314-23-4, Zirconia, uses  
(structure and manufacture of fuel cells with Bronsted acid modified zirconia **proton** conducting gel electrolyte in ceramic fiber sheets)

IT 25067-11-2, Hexafluoropropylene-tetrafluoroethylene copolymer  
(structure and manufacture of **proton** conducting gel electrolyte fuel cells containing hydrophobic carbonaceous electrodes)

IT 7440-06-4, Platinum, uses  
(structure and manufacture of **proton** conducting gel electrolyte fuel cells with catalytic gas diffusion electrodes)

REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L79 ANSWER 4 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2002:486420 HCAPLUS Full-text

DOCUMENT NUMBER: 137:35575

TITLE: Gas diffusion layer, **electrolyte membrane**/electrode laminate, polymer electrolyte fuel cell, and manufacture of the laminate

INVENTOR(S): Sakai, Osamu; Shinkura, Junji; Uchida, Makoto; Yasumoto, Eiichi; Yoshida, Akihiko; Kanbara, Teruhisa

PATENT ASSIGNEE(S): Matsushita Electric Industrial Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 6 pp.  
CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2002184412	A	20020628	JP 2001-309634	20011005
			<--	
PRIORITY APPLN. INFO.:			JP 2000-306405	A 20001005
			<--	

ED Entered STN: 28 Jun 2002

AB The gas diffusion layer has a conductive particle surface layer on a porous material, covering ≥80% of the porous material. The electrolyte membrane/electrode laminate contains a H<sup>+</sup> conductive polymer electrolyte membrane between 2 catalyst layers, and the previous described gas diffusion layers on the catalyst layers. The polymer electrolyte fuel cell has unit cells having the electrolyte membrane/electrode laminate held between conductive gas passage separators. The electrolyte membrane/electrode laminate is prepared by hot pressing a hydrogen ion conductivity polymer electrolyte membrane, having catalyst layers on both sides, between a pair of gas diffusion layers.

IC ICM H01M004-86  
ICS H01M004-88; H01M008-02; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polymer electrolyte fuel cell gas diffusion layer; electrode electrolyte membrane laminate manuf fuel cell

IT Carbon fibers, uses  
(fabrics, carbon conductive porous material; components of gas diffusion layer for electrolyte membrane electrode zygote)

IT Fuel cell electrolytes  
Fuel cells  
(gas diffusion layer for polymer electrolyte fuel cell and manufacture of electrolyte membrane/electrode laminates for the cells)

IT Fuel cell electrodes  
(gas diffusion; gas diffusion layer for polymer electrolyte fuel cell and manufacture of electrolyte membrane /electrode laminates for the cells)

IT Carbonaceous materials (technological products)  
(sheets; carbonaceous gas diffusion layers for polymer electrolyte fuel cell and manufacture of cell electrolyte membrane /electrode laminates)

L79 ANSWER 5 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2002:216383 HCAPLUS Full-text

DOCUMENT NUMBER: 136:234757

TITLE: **Electrolyte membrane, fuel**  
cell, and manufacture of the membrane and the cell

INVENTOR(S): Yamaguchi, Takeo; Nakao, Shinichi

PATENT ASSIGNEE(S): Foundation for Scientific Technology Promotion,  
Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 11 pp.  
CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2002083612	A	20020322	JP 2000-272203	20000907

PRIORITY APPLN. INFO.: JP 2000-272203 20000907  
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ED Entered STN: 22 Mar 2002

AB The electrolyte membrane has a H<sup>+</sup> conductive polymer filled in the pores of a MeOH- and H<sub>2</sub>O-non-swellable porous substrate. The membrane is prepared by bonding a 1st polymer with its 1 end to the pores of a porous substrate, swell resistant to organic solvent or water, and bonding a 2nd polymer to the other

end of the 1st **polymer**; where the 2 **polymers** are the same or different but are both H conductive. The fuel cell has the **electrolyte membrane** between a **cathode** and an **anode**, and is prepared by forming a 1st electrode from a sol, forming a **porous** film on the electrode, forming an **electrolyte membrane** by the above method using the **porous** film, and applying a 2nd electrode on the **electrolyte membrane**.

IC ICM H01M008-02  
ICS C08J009-40; H01M008-10; C08L027-18; C08L079-08  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
ST fuel cell **proton conducting polymer**  
**electrolyte membrane** manuf  
IT **Fuel cell electrolytes**  
(structure and manufacture of **proton conducting polymer** grafted in **porous** Teflon membranes for fuel cell electrolytes)  
IT **Fluoropolymers**, uses  
(structure and manufacture of **proton conducting polymer** grafted in **porous** Teflon membranes for fuel cell electrolytes)  
IT 9002-84-0, Teflon  
(structure and manufacture of **proton conducting polymer** grafted in **porous** Teflon membranes for fuel cell electrolytes)  
IT 79-10-7, Acrylic acid, uses 1184-84-5, Vinylsulfonic acid  
(structure and manufacture of **proton conducting polymer** grafted in **porous** Teflon membranes for fuel cell electrolytes)

L79 ANSWER 6 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2002:216370 HCAPLUS Full-text  
DOCUMENT NUMBER: 136:265786  
TITLE: **Proton**-conducting membrane or film, its manufacture, and fuel cell using it  
INVENTOR(S): Fujita, Shigeru; Abe, Masao  
PATENT ASSIGNEE(S): Nitto Denko Corp., Japan  
SOURCE: Jpn. Kokai Tokkyo Koho, 10 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2002083514	A	20020322	JP 2000-275015	20000906

PRIORITY APPLN. INFO.: JP 2000-275015 20000906  
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ED Entered STN: 22 Mar 2002

AB The **proton**-conducting membrane comprises a **porous** membrane filled with a polymer having a phosphate-, phosphonate-, or phosphinate group at side chain in **pores**. A **proton** -conducting film consists of the above membrane, where a part of voids in the **pores** are closed. The membrane is manufactured by impregnating a monomer having a phosphate-, phosphonate-, or phosphinate side chain in a **porous** membrane and then polymerizing in the **pores**. The film is manufactured from the membrane by closing the **pores**. Also claimed is a fuel cell equipped with the membrane or the film as a **proton**-exchange membrane. The membrane and the film have high durability and strength.

IC ICM H01B001-06  
ICS C08F002-00; C08J009-36; C08J009-40; H01B013-00; H01M008-02;

H01M008-10; C08L023-02; C08L027-12

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 76

ST **proton conducting polymer** membrane film  
phosphate phosphonate phosphinate group; fuel cell **proton  
conducting polymer** membrane

IT Fluoropolymers, uses  
Polyolefins  
(**porous substrates; proton-conducting**  
membrane or film containing polymer having phosphate-, phosphonate-, or  
phosphinate side chain for fuel cell)

IT Films  
**Fuel cell electrolytes**  
Ionic conductors  
Membranes, nonbiological  
(**proton-conducting membrane** or film containing  
polymer having phosphate-, phosphonate-, or phosphinate side chain  
for fuel cell)

IT Fuel cells  
(solid **electrolyte; proton-conducting**  
**membrane** or film containing polymer having phosphate-,  
phosphonate-, or phosphinate side chain for fuel cell)

IT 9002-88-4, Polyethylene  
(UHMWPE, **porous substrate; proton**  
-conducting membrane or film containing polymer having phosphate-,  
phosphonate-, or phosphinate side chain for fuel cell)

IT 51131-63-6P, Light Ester P 1M homopolymer 103719-23-9P, Butyl  
acrylate-Light Ester P 1M **copolymer**  
(**proton-conducting** membrane or film containing  
polymer having phosphate-, phosphonate-, or phosphinate side chain  
for fuel cell)

L79 ANSWER 7 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2002:69613 HCAPLUS Full-text

DOCUMENT NUMBER: 136:121086

TITLE: Manufacture of electrode-electrolyte composites  
for fuel cells and substrates therefor

INVENTOR(S): Inuzuka, Kyoko

PATENT ASSIGNEE(S): Toyota Motor Corp., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 8 pp.  
CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2002025578	A	20020125	JP 2000-210739	20000712

PRIORITY APPLN. INFO.: JP 2000-210739 20000712  
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ED Entered STN: 25 Jan 2002

AB The composites are manufactured by applying an ink containing catalysts on a  
**porous substrate**, pressing the **substrate** with a polymer **electrolyte membrane**,  
and sending a fluid (e.g., compressed air) to the substrate to remove the  
substrate from the catalyst ink. Preferably, the substrate has a surface  
roughness of water contact angle  $\geq 120^\circ$ . The process prevents damaging of the  
catalyst layer as the electrode.

IC ICM H01M008-02

- ICS H01M004-88; H01M008-10
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 67
- ST **porous substrate** electrolyte fuel cell;  
polymer electrolyte electrode catalyst fuel cell
- IT Fluoropolymers, uses  
(coating on temporary substrate; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT Catalysts  
(electrocatalysts; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT Polyoxyalkylenes, uses  
(fluorine- and sulfo-containing, ionomers, Nafion; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT **Conducting polymers**  
(ionic; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT Fuel cell electrodes  
**Fuel cell electrolytes**  
Polymer electrolytes.  
(manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT **Ionic conductors**  
(polymeric; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT Fluoropolymers, uses  
(polyoxyalkylene-, sulfo-containing, ionomers, Nafion; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT Ionomers  
(polyoxyalkylenes, fluorine- and sulfo-containing, Nafion; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT Fluoropolymers, uses  
(temporary substrate; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT **Porous materials**  
(temporary **substrates**; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT Platinum alloy, base  
(catalyst; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT 7440-06-4, Platinum, uses  
(catalyst; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)
- IT 9002-84-0, Teflon  
(temporary substrate; manufacture of electrode-polymer electrolyte composites for fuel cells with **porous substrates**)

L79 ANSWER 8 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2002:69605 HCAPLUS Full-text

DOCUMENT NUMBER: 136:121079

TITLE: Polymer electrolyte fuel cells and their

INVENTOR(S): manufacture  
 Takebe, Yasuo; Hosaka, Masato; Gyoten, Hisaaki;  
 Uchida, Makoto; Shinkura, Junji; Hato, Kazuhito;  
 Kanbara, Teruhisa  
 PATENT ASSIGNEE(S): Matsushita Electric Industrial Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2002025564	A	20020125	JP 2000-204718	20000706

PRIORITY APPLN. INFO.: JP 2000-204718 20000706  
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ED Entered STN: 25 Jan 2002

AB The fuel cells contain polymer **electrolyte membranes** sandwiched between a pair of electrodes having catalyst layers containing C-supported catalysts, polymer electrolytes, and elec. **conductive polymers** prepared by polymerization of monomers selected from pyrrole, thiophene, aniline, dihalogenated benzene, dihalogenated thiophene, and dihalogenated pyridine. The manufacturing process includes chemical or electrolytic polymerization of the monomers in the catalyst mixts. and application of the mixts. on **porous** electrodes to form the catalyst layers. Th C-supported catalysts are coated with the elec. **conductive polymers** to achieve high catalytic efficiency and high performance of the fuel cells.

IC ICM H01M004-96

ICS H01M004-88; H01M008-02; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38, 67

ST **conducting polymer** electrolyte fuel cell catalyst;  
 carbon catalyst polymer electrolyte fuel cell

IT Catalysts

(electrocatalysts; polymer electrolyte fuel cells having  
 C-supported catalyst layers containing elec. **conductive  
 polymers**)

IT Polyoxyalkylenes, uses

(fluorine- and sulfo-containing, ionomers, Nafion; polymer electrolyte  
 fuel cells having C-supported catalyst layers containing elec.  
**conductive polymers**)

IT **Conducting polymers**

(ionic; **polymer** electrolyte fuel cells having C-supported  
 catalyst layers containing elec. **conductive polymers**  
 )

IT Catalyst supports

Fuel cell electrodes

**Fuel cell electrolytes**

Polymer electrolytes

(polymer electrolyte fuel cells having C-supported catalyst layers  
 containing elec. **conductive polymers**)

IT Polyanilines

(polymer electrolyte fuel cells having C-supported catalyst layers  
 containing elec. **conductive polymers**)

IT Ionic **conductors**

(**polymeric**; **polymer** electrolyte fuel cells  
 having C-supported catalyst layers containing elec. **conductive  
 polymers**)

- IT Fluoropolymers, uses  
(polyoxyalkylene-, sulfo-containing, ionomers, Nafion; polymer electrolyte fuel cells having C-supported catalyst layers containing elec. **conductive polymers**)
- IT Ionomers  
(polyoxyalkylenes, fluorine- and sulfo-containing, Nafion; polymer electrolyte fuel cells having C-supported catalyst layers containing elec. **conductive polymers**)
- IT Fuel cells  
(solid electrolyte; polymer electrolyte fuel cells having C-supported catalyst layers containing elec. **conductive polymers**)
- IT 7440-44-0, Carbon, uses  
(catalyst support; polymer electrolyte fuel cells having C-supported catalyst layers containing elec. **conductive polymers**)
- IT 7440-06-4, Platinum, uses 390761-63-4, TEC 10E50E  
(catalyst; polymer electrolyte fuel cells having C-supported catalyst layers containing elec. **conductive polymers**)
- IT 291280-30-3, TGP-H 120  
(electrode; polymer electrolyte fuel cells having C-supported catalyst layers containing elec. **conductive polymers**)
- IT 163294-14-2, Nafion 112  
(polymer electrolyte fuel cells having C-supported catalyst layers containing elec. **conductive polymers**)
- IT 25233-30-1P, Polyaniline 25233-34-5P, Polythiophene 30604-81-0P, Polypyrrole 73061-85-5P, 2,5-Dibromothiophene homopolymer 113814-61-2P, Dibromobenzene homopolymer 183025-63-0P 390739-10-3P 390750-16-0P  
(polymer electrolyte fuel cells having C-supported catalyst layers containing elec. **conductive polymers**)

L79 ANSWER 9 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2001:284286 HCAPLUS Full-text  
 DOCUMENT NUMBER: 134:283338  
 TITLE: Fuel cell  
 INVENTOR(S): Bruder, Michael; Heiber, Uwe; Krause, Karl-Heinz; Merkmann, Gerhard  
 PATENT ASSIGNEE(S): Intech Thuringen G.m.b.H., Germany  
 SOURCE: PCT Int. Appl., 17 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: German  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	-----
WO 2001028023	A2	20010419	WO 2000-DE3263	20000920
			<--	
WO 2001028023	A3	20011227		
W: AU, BR, CA, CN, CZ, HU, IN, JP, KR, MX, PL, RU, SK, UA, US, ZA				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
DE 10046388	A1	20010419	DE 2000-10046388	20000920
			<--	
EP 1228548	A2	20020807	EP 2000-967596	20000920
			<--	



09/936,148

EP 1228548 B1 20040324

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL

AT 262734 T 20040415 AT 2000-967596 20000920

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PRIORITY APPLN. INFO.:

DE 1999-19949068 A 19991012

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WO 2000-DE3263 W 20000920

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ED Entered STN: 20 Apr 2001

AB The invention relates to a fuel cell comprising at least the following components: a **proton-conducting polymer** membrane acting as the electrolyte, catalyst layers that cover the polymer membrane on both sides, **gas-permeable** electrodes in the form of an anode and a cathode which rest on a surface of the catalyst layers, whereby the surface is directed towards the outside, electroconductive plates which contact the electrodes in an electroconductive manner and at closely adjacent distances and, together with the electrodes, define gas-conducting channels as well as gas supplies for the supply of H on the one hand and O on the other hand. The inventive fuel cell is characterized in that the polymer membrane is a vulcanized caoutchouc mixture on the basis of a halogenated caoutchouc, especially when bromobutyl caoutchouc is used. The invention also relates to advantageous variants of the polymer membrane, e.g. when the caoutchouc mixture contains a mol. sieve/acid adduct.

IC ICM H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 39

ST fuel cell polymer membrane; rubber **membrane electrolyte** fuel cell

IT Synthetic rubber, uses  
(brominated, vulcanized; polymer **electrolyte membrane** fuel cell)

IT Butyl rubber, uses  
(brominated; polymer **electrolyte membrane** fuel cell)

IT Butyl rubber, uses  
(chlorinated; polymer **electrolyte membrane** fuel cell)

IT Synthetic rubber, uses  
(chlorine-containing, vulcanized; polymer **electrolyte membrane** fuel cell)

IT Synthetic rubber, uses  
(fluorinated, vulcanized; polymer **electrolyte membrane** fuel cell)

IT Synthetic rubber, uses  
(halogenated, vulcanized; polymer **electrolyte membrane** fuel cell)

IT **Fuel cell electrolytes**  
Fuel cells  
(polymer **electrolyte membrane** fuel cell)

IT Neoprene rubber, uses  
Zeolites (synthetic), uses  
(polymer **electrolyte membrane** fuel cell)

IT 9010-85-9  
(butyl rubber, brominated; polymer **electrolyte membrane** fuel cell)

IT 9010-85-9  
(butyl rubber, chlorinated; polymer **electrolyte membrane** fuel cell)

IT 7664-38-2, Phosphoric acid, uses

09/936,148

(cellulose acetated loaded with; polymer electrolyte  
membrane fuel cell)

IT 9010-98-4  
(neoprene rubber, polymer electrolyte membrane  
fuel cell)

IT 9004-35-7, Cellulose acetate  
(phosphoric acid-loaded; polymer electrolyte  
membrane fuel cell)

IT 1343-98-2, Silicic acid  
(polymer electrolyte membrane fuel cell)

L79 ANSWER 10 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2001:229197 HCAPLUS Full-text

DOCUMENT NUMBER: 134:254655

TITLE: Electrode-ion exchanger electrolyte  
membrane laminates for polymer

electrolyte fuel cells and their manufacture

INVENTOR(S): Kunisa, Yasuhiro; Yoshitake, Masaru; Endoh, Eiichi;  
Yanagisawa, Eiichi

PATENT ASSIGNEE(S): Asahi Glass Company, Limited, Japan

SOURCE: PCT Int. Appl., 24 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001022510	A1	20010329	WO 2000-JP6384	20000919

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W: JP, US

RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
NL, PT, SE

EP 1223628	A1	20020717	EP 2000-961084	20000919
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R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT, IE, FI, CY

PRIORITY APPLN. INFO.: JP 1999-266067 A 19990920

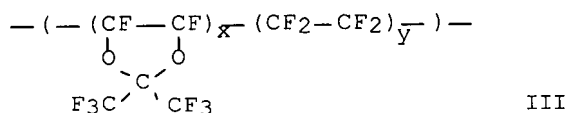
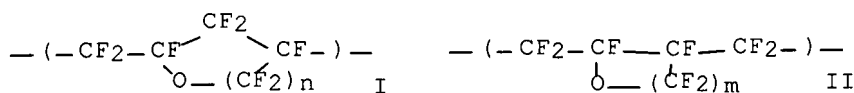
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WO 2000-JP6384                      W 200000919

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ED Entered STN: 30 Mar 2001

GI



AB The laminates have an ion exchanger **electrolyte membrane** between a **cathode** and an **anode**; where the **cathode** and/or **anode** has a **porous C substrate**, a fluoro resin-carbon black gas diffusion layer on the substrate, a catalyst layer containing a sulfonated fluorocarbon **polymer** on the gas diffusion layer, and a soluble non-ion exchanger **fluoropolymer** with the catalyst layer contacting the **electrolyte membrane**; and the **electrolyte membrane** is a 20-150  $\mu\text{m}$  thick sulfonated fluorocarbon **polymer**. The soluble **fluoropolymer** is I, II, or III. The laminates are prepared by applying a **fluoropolymer**-carbon black mixture on a **porous C substrates**, with part of the mixture filled in the **pores** of the **substrate**, to form a gas diffusion layer, applying a catalyst layer on gas diffusion layer, impregnating the assemblies with a solution of a soluble **fluoropolymer**, firing at 100-200° to obtain gas diffusion electrodes, holding an ion exchanger **electrolyte membrane** between 2 gas diffusion electrodes, with the catalyst layers facing each other, and hot pressing.

IC ICM H01M004-96  
ICS H01M004-88; H01M008-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **polymer** electrolyte fuel cell ion exchanger electrode laminate manuf; sol **fluoropolymer** fuel cell electrode electrolyte laminate

IT **Fluoropolymers**, uses  
(gas diffusion electrode-ion exchanger **electrolyte membrane** laminates containing non-ion exchanger **fluoropolymers** for fuel cells)

IT Fuel cells  
(structure and manufacture of gas diffusion electrode-ion exchanger **electrolyte membrane** laminates for fuel cells)

IT Carbon black, uses  
Carbon fibers, uses  
**Fluoropolymers**, uses  
(structure and manufacture of gas diffusion electrode-ion exchanger **electrolyte membrane** laminates for fuel cells)

IT 69818-05-9  
(gas diffusion electrode-ion exchanger **electrolyte membrane** laminates containing non-ion exchanger **fluoropolymers** for fuel cells)

IT 9002-84-0, Polytetrafluoroethylene 331412-09-0  
(structure and manufacture of gas diffusion electrode-ion exchanger **electrolyte membrane** laminates for fuel cells)

REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L79 ANSWER 11 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2001:168296 HCAPLUS Full-text

DOCUMENT NUMBER: 134:195783

TITLE: **Polymer** electrolyte fuel cells

INVENTOR(S): Sugawara, Yasushi; Gyoten, Hisaaki; Uchida, Makoto; Yasumoto, Eiichi; Kanbara, Teruhisa; Morita, Junji; Hori, Yoshihiro; Yoshida, Akihiko; Wakita, Hidenobu; Kusakabe, Hiroki; Hosaka, Masato; Sakai, Osamu

PATENT ASSIGNEE(S): Matsushita Electric Industrial Co., Ltd., Japan

SOURCE: PCT Int. Appl., 57 pp.  
CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001017047	A1	20010308	WO 2000-JP5729	20000824
<--				
WO 2001017047	A9	20020725		
W: CN, JP, KR, US				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,				
NL, PT, SE				
EP 1229600	A1	20020807	EP 2000-955010	20000824
<--				
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,				
PT, IE, FI, CY				
US 6818339	B1	20041116	US 2002-49567	20020215
<--				
PRIORITY APPLN. INFO.:			JP 1999-242133	A 19990827
			<--	
			JP 1999-285553	A 19991006
			<--	
			JP 1999-299645	A 19991021
			<--	
			JP 1999-316723	A 19991108
			<--	
			WO 2000-JP5729	W 20000824
<--				

ED Entered STN: 09 Mar 2001

AB The fuel cells have a H<sup>+</sup> conducting **polymer electrolyte membrane**, a **cathode** and an **anode** holding the membrane in between, and reaction gas passage conductive separators on the backside of the electrodes; where the electrodes contain catalyst particles, a H<sup>+</sup> conductive **polymer electrolyte**, a **porous** conductive **substrate**, and a hydrophobic agent, whose concentration changes in the thickness direction, or in a direction parallel to the surface, in the **cathode** and/or **anode**.

IC ICM H01M004-86

ICS H01M008-02; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **polymer** electrolyte fuel cell electrode hydrophobic agent;

fuel cell electrode hydrophobic agent distribution

IT Fuel cell electrodes

(carbon fiber sheets with hydrophobic agent content grade for catalytic electrodes in **polymer** electrolyte fuel cells)

IT Carbon fibers, uses

**Fluoropolymers**, uses

(carbon fiber sheets with hydrophobic agent content grade for catalytic electrodes in **polymer** electrolyte fuel cells)

IT 9002-84-0, Polytetrafluoroethylene

(carbon fiber sheets with hydrophobic agent content grade for catalytic electrodes in **polymer** electrolyte fuel cells)

REFERENCE COUNT: 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L79 ANSWER 12 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2004:894308 HCAPLUS Full-text

DOCUMENT NUMBER: 142:97392

TITLE: Fuel cell with multilayered ion-conductive **polymer** membrane

INVENTOR(S): Kim, Hye Gyeong

PATENT ASSIGNEE(S): Samsung Electronics Co., Ltd., S. Korea

SOURCE: Repub. Korean Kongkae Taeho Kongbo, No pp. given

09/936,148

DOCUMENT TYPE: Patent  
 LANGUAGE: Korean  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
KR 2001093359	A	20011029	KR 2000-15876	20000328

PRIORITY APPLN. INFO.: KR 2000-15876 20000328  
 <--

ED Entered STN: 27 Oct 2004

AB This multilayered ion-**conductive polymer** membrane for fuel cells inhibits H<sub>2</sub>O from moving from the cathode to the anode and prevents the deterioration of the ion conductivity due to an increase in temperature, thereby improving the efficiency and performance of the fuel cell. The fuel cell comprises a cathode, an anode and an ion- **conductive polymer** membrane between the 2 electrodes, wherein the membrane is provided with a 1st ion- **conductive polymer** membrane which is formed on the cathode and comprises an ion-exchange polymer and a material with good H<sub>2</sub>O **absorption**, and a 2nd ion-**conductive polymer** membrane which is formed on the anode and comprises an ion-exchange polymer and a metal catalyst. Preferably the 1st and 2nd ion-**conductive polymer** membranes are multilayered structures. The concentration of the H<sub>2</sub>O-absorbing material of the 1st ion- **conductive polymer** membrane, and the concentration of metal catalyst of the 2nd ion-**conductive polymer** membrane decreases from the polymer membrane to the interface between the 2 polymer membranes.

IC ICM H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell multilayered ion **conductive polymer**  
**membrane electrolyte**

IT **Fuel cell electrolytes**

Fuel cell separators

Fuel cells

(fuel cell with multilayered ion-**conductive polymer** membrane)

L79 ANSWER 13 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2001:579432 HCAPLUS Full-text

DOCUMENT NUMBER: 135:168823

TITLE: Polymer-**electrolyte membrane**,  
 its manufacture by introducing ion-exchange group,  
 and fuel cell

INVENTOR(S): Nakajima, Katsuhiko

PATENT ASSIGNEE(S): Toyota Motor Corp., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2001216837	A	20010810	JP 2000-23578	20000201

PRIORITY APPLN. INFO.: JP 2000-23578 20000201  
 <--

ED Entered STN: 10 Aug 2001

- AB The polymer-electrolyte membrane has a first region containing a polymer having an ion-exchange group for ion conductivity and a second region containing a polymer free from the ion-exchange group. The membrane is manufactured by preparing a polymer membrane and then introducing an ion-exchange group to a part of the membrane. The ion-exchange group may be introduced by graft copolymn. for adding a side chain. A polymer-electrolyte fuel cell equipped with the above membrane is also claimed. Thus, an ethylene-tetrafluoroethylene copolymer base film (50  $\mu\text{m}$ -thick) was irradiated with an electron beam through a mask having plural holes, graft polymerized with styrene and 1,4-butanediol diacrylate to give side chains, and then reacted with chlorosulfonic acid for sulfonating the aromatic side chain to give a membrane having high ion conductivity and film strength.
- IC ICM H01B001-06  
ICS H01M008-02; H01M008-10; C08J005-22
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 76
- IT Polymerization  
(graft; polymer-electrolyte membrane manufactured by partially introducing ion-exchange group for fuel cell)
- IT Fuel cell electrolytes  
Polymer electrolytes  
Sulfonation  
(polymer-electrolyte membrane manufactured by partially introducing ion-exchange group for fuel cell)
- IT Fluoropolymers, uses  
(polymer-electrolyte membrane manufactured by partially introducing ion-exchange group for fuel cell)
- IT Ionic conductors  
(polymeric; polymer-electrolyte membrane manufactured by partially introducing ion-exchange group for fuel cell)
- IT 7790-94-5DP, Chlorosulfonic acid, reaction products with butanediol diacrylate-ethylene-styrene-tetrafluoroethylene graft copolymer 353798-54-6DP, sulfonated  
(polymer-electrolyte membrane manufactured by partially introducing ion-exchange group for fuel cell)

L79 ANSWER 14 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2000:362780 HCAPLUS Full-text  
DOCUMENT NUMBER: 133:7036  
TITLE: Proton-conductive solid

polymer electrolyte  
membranes for fuel cells  
INVENTOR(S): Oomichi, Takahiro; Kawaguchi, Takeyuki  
PATENT ASSIGNEE(S): Teijin Ltd., Japan  
SOURCE: Jpn. Kokai Tokkyo Koho, 5 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2000149965	A	20000530	JP 1998-320425	19981111
			<--	
PRIORITY APPLN. INFO.:			JP 1998-320425	19981111
			<--	

ED Entered STN: 31 May 2000

- AB The polymer **electrolyte membranes** show piercing strength  $\geq 300$  g and mech. heat resistance  $\geq 300^\circ$ . The membranes may be composites of H+-**conductive polymer** electrolytes with **porous** thin films, which may be made of aramid fiber fabrics, sheets, or films with high strength and high gas permeability.
- IC ICM H01M008-02  
ICS B32B005-18; C08J005-22
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38
- ST polymer **electrolyte membrane** strength fuel cell;  
aramid support polymer electrolyte fuel cell; heat resistance polymer electrolyte fuel cell
- IT Polyamide fibers, uses  
(aramid, fabrics, membrane supports; high-strength heat-resistant H+-**conductive solid polymer electrolyte membranes** for fuel cells)
- IT Nonwoven fabrics  
(aramid, membrane supports; high-strength heat-resistant H+-**conductive solid polymer electrolyte membranes** for fuel cells)
- IT Polyoxyalkylenes, uses  
(fluorine- and sulfo-containing, ionomers, Nafion; high-strength heat-resistant H+-**conductive solid polymer electrolyte membranes** for fuel cells)
- IT Polyoxyalkylenes, uses  
(fluorine-containing, sulfo-containing, ionomers, Nafion; high-strength heat-resistant H+-**conductive solid polymer electrolyte membranes** for fuel cells)
- IT **Fuel cell electrolytes**  
Polymer electrolytes  
(high-strength heat-resistant H+-**conductive solid polymer electrolyte membranes** for fuel cells)
- IT **Conducting polymers**  
(ionic; high-strength heat-resistant H+-**conductive solid polymer electrolyte membranes** for fuel cells)
- IT **Ionic conductors**  
(polymeric; high-strength heat-resistant H+-**conductive solid polymer electrolyte membranes** for fuel cells)
- IT Fluoropolymers, uses  
Fluoropolymers, uses  
(polyoxyalkylene-, sulfo-containing, ionomers, Nafion; high-strength heat-resistant H+-**conductive solid polymer electrolyte membranes** for fuel cells)
- IT Ionomers  
(polyoxyalkylenes, fluorine- and sulfo-containing, Nafion; high-strength heat-resistant H+-**conductive solid polymer electrolyte membranes** for fuel cells)

L79 ANSWER 15 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2000:572544 HCAPLUS Full-text

DOCUMENT NUMBER: 134:101841

TITLE: Formation of **porous polymer electrolyte membrane** for PEFC

AUTHOR(S): Totsuka, Kazuhide; Hitomi, Shuji; Yasuda, Hideo; Yamachi, Masanori

CORPORATE SOURCE: Nippon Denchi K.K., Japan

SOURCE: GS News Technical Report (2000), 59(1),

16-21

CODEN: GSNTAA; ISSN: 0385-7204

PUBLISHER:

Nippon Denchi K.K.

DOCUMENT TYPE:

Journal

LANGUAGE:

Japanese

ED Entered STN: 18 Aug 2000

AB A new **porous** polymer **electrolyte membrane** with high **proton** conductivity and high gas diffusion capability has been developed in order to improve the performance for PEFC (polymer electrolyte fuel cell). Its **pore** size and porosity have been found to be strongly depended on both the concentration of perfluorosulfonate solution as its precursor and kinds of organic solvent as an extraction solution for its gelation. The only slightly decrease in conductivity of **porous** membrane was observed, though its material volume decreased and the tortuosity for the **proton** transport increased by three dimensionally **pore** formation. This effect seems to be derived from the contribution of the anisotropic conductance of the **porous** polymer **electrolyte membrane**.

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 76

ST perfluorosulfonate **porous** polymer **electrolyte membrane** fuel cell; **proton** cond  
**porous** polymer **electrolyte membrane**

IT Solvent effect

(on preparation and properties of **porous** polymer  
**electrolyte membrane** for polymer  
**electrolyte** fuel cell)

IT Crystallinity

Electric conductivity

**Fuel cell electrolytes**

Membranes, nonbiological

Polymer electrolytes

Polymer morphology

**Pore**

**Pore size**

(preparation and properties of **porous** polymer  
**electrolyte membrane** for polymer  
**electrolyte** fuel cell)

IT Ionomers

(preparation of **porous** polymer **electrolyte membrane** for polymer **electrolyte** fuel cell)

IT Fluoropolymers, uses

(**substrate**; preparation of **porous** polymer  
**electrolyte membrane** for polymer  
**electrolyte** fuel cell)

IT Fluoropolymers, uses

(sulfonic acid-containing; preparation of **porous** polymer  
**electrolyte membrane** for polymer  
**electrolyte** fuel cell)

IT Polymer morphology

(surface; preparation and properties of **porous** polymer  
**electrolyte membrane** for polymer  
**electrolyte** fuel cell)

IT 78-81-9, Isobutylamine 79-09-4, Propionic acid, uses 79-20-9,  
Methyl acetate 97-62-1, Ethyl isobutyrate 105-54-4, Ethyl butyrate  
109-60-4, Propyl acetate 109-99-9, THF, uses 110-71-4, Ethylene  
glycol dimethyl ether 110-74-7, Propyl formate 111-14-8, Heptanoic  
acid 111-43-3, Propyl ether 123-19-3, Dipropyl ketone 123-86-4,  
Butyl acetate 141-32-2, Butyl acrylate 592-84-7, Butyl formate  
(solvent effect on preparation and properties of **porous**



09/936,148

polymer electrolyte membrane for polymer  
electrolyte fuel cell)  
IT 25067-11-2, Hexafluoropropylene-tetrafluoroethylene copolymer  
(substrate; preparation of porous polymer  
electrolyte membrane for polymer  
electrolyte fuel cell)

L79 ANSWER 16 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 1999:631497 HCAPLUS Full-text  
DOCUMENT NUMBER: 131:259912  
TITLE: Membrane electrode assembly for polymer  
electrolyte membrane fuel cell  
and method for its manufacture  
INVENTOR(S): Zuber, Ralf; Fehl, Knut; Starz, Karl-anton;  
Stenke, Udo  
PATENT ASSIGNEE(S): Degussa-Huls A.-G., Germany; Umicore AG & Co. KG  
SOURCE: Eur. Pat. Appl., 13 pp.  
CODEN: EPXXDW  
DOCUMENT TYPE: Patent  
LANGUAGE: German  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 945910	A2	19990929	EP 1999-104630	19990309
<--				
EP 945910	A3	20040107		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
DE 19812592	A1	19991007	DE 1998-19812592	19980323
<--				
DE 19812592	B4	20040513		
EP 1536504	A1	20050601	EP 2005-3955	19990309
<--				
R: DE, DK, FR, GB, IT, NL				
CA 2266239	A1	19990923	CA 1999-2266239	19990322
<--				
US 6309772	B1	20011030	US 1999-274018	19990322
<--				
JP 11329452	A	19991130	JP 1999-77861	19990323
<--				
BR 9900605	A	20000606	BR 1999-605	19990323
<--				
PRIORITY APPLN. INFO.:			DE 1998-19812592	A 19980323
<--				
			EP 1999-104630	A3 19990309
<--				

ED Entered STN: 06 Oct 1999

AB The membrane electrode assembly of the fuel cell comprises a polymer  
electrolyte membrane with porous reaction layers containing catalysts and  
ionomers on both sides of the membrane. The reaction layer has an  
inhomogeneous microstructure formed from an ionomer-impregnated and embedded  
catalyst portion and an ionomer-free catalyst portion in weight ratio (1-  
20):1, especially (3-10):1. The catalyst can be carbon-supported Pt-group  
metal or alloy particles. The reaction layer has pore volume 0.7-1.3,  
especially 0.8-1.2 mL/g, for pores with diameter 0.03-1 µm, and thickness 5-  
100, especially 10-100 µm. The ionomer can be a proton- conducting  
tetrafluoroethylene-fluorovinylether copolymer containing acid groups, e.g.,  
Nafion.

IC ICM H01M008-10  
ICS H01M004-92

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 37, 67

ST membrane electrode assembly PEM fuel cell; polymer **electrolyte**  
**membrane** fuel cell

IT Carbon black, uses  
(catalyst supports; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT Platinum-group metals  
(catalysts; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT Glycols, uses  
(ethers, solvents; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT Polyoxyalkylenes, uses  
(fluorine- and sulfo-containing, ionomers, **proton**-conducting;  
membrane electrode assembly for polymer **electrolyte**  
**membrane** fuel cells)

IT Polyoxyalkylenes, uses  
(fluorine-containing, sulfo-containing, ionomers, **proton**  
-conducting; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT Ethers, uses  
(glycol, solvents; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT Fuel cell electrolytes  
(polymer **membranes**; **membrane** electrode assembly  
for polymer **electrolyte membrane** fuel cells)

IT Fuel cells  
(polymer-**electrolyte-membrane**; **membrane**  
electrode assembly for polymer **electrolyte**  
**membrane** fuel cells)

IT Fluoropolymers, uses  
Fluoropolymers, uses  
(polyoxyalkylene-, sulfo-containing, ionomers, **proton**  
-conducting; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT Ionomers  
(polyoxyalkylenes, fluorine- and sulfo-containing, **proton**  
-conducting; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT Fluoropolymers, uses  
Ionomers  
(**proton**-conducting; membrane electrode assembly for  
polymer **electrolyte membrane** fuel cells)

IT Alcohols, uses  
Glycols, uses  
Hydrocarbons, uses  
Paraffin oils  
(solvents; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT Solvents  
(weakly polar; nonpolar; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-16-6,  
Rhodium, uses  
(catalysts; membrane electrode assembly for polymer  
**electrolyte membrane** fuel cells)

IT 77950-55-1, Nafion 115

- (membranes; membrane electrode assembly for polymer **electrolyte membrane** fuel cells)
- IT 7439-89-6, Iron, uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses 7440-18-8, Ruthenium, uses 7440-33-7, Tungsten, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-62-2, Vanadium, uses (platinum group metals alloyed with, catalysts; membrane electrode assembly for polymer **electrolyte membrane** fuel cells)
- IT 116-14-3D, Tetrafluoroethylene, fluorovinylether **copolymers**, functionalized 57578-63-9D, Perfluorovinylether-tetrafluoroethylene **copolymer**, functionalized (proton-conducting; membrane electrode assembly for polymer **electrolyte membrane** fuel cells)
- IT 56-81-5, 1,2,3-Propanetriol, uses 57-55-6, 1,2-Propanediol, uses 107-41-5, Hexylene glycol 110-38-3, Decanoic acid, ethyl ester 111-82-0, Dodecanoic acid, methyl ester 463-79-6D, Carbonic acid, alkyl esters, uses 25265-71-8, Dipropylene glycol (solvents; membrane electrode assembly for polymer **electrolyte membrane** fuel cells)

L79 ANSWER 17 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1998:52365 HCAPLUS Full-text

DOCUMENT NUMBER: 128:90970

TITLE: Proton conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane

AUTHOR(S): Sumner, J. J.; Creager, S. E.; Ma, J. J. A.; DesMarteau, D. D.

CORPORATE SOURCE: Dep. Chem., Clemson Univ., Clemson, SC, 29634, USA

SOURCE: Journal of the Electrochemical Society (

1998), 145(1), 107-110

CODEN: JESOAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

ED Entered STN: 30 Jan 1998

AB A study of **proton** conductivity in a com. sample of Nafion 117 and a structurally similar bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane under variable temperature and humidity conditions is reported. The sulfonyl imide ionomer was synthesized using a novel redox-initiated emulsion **copolymer**. method, and **conductivities** were measured using a galvanostatic four-point-probe electrochem. impedance spectroscopy technique. Both materials exhibited a strong dependence of conductivity on temperature and humidity, with conductivity in both cases being strongly diminished with decreasing humidity (at constant temperature) and increasing temperature (at constant water partial pressure). The observed behavior is consistent with a "liquid-like" mechanism of **proton** conductivity whereby **protons** are transported as hydrated hydronium ions through water-filled **pores** and channels in the ionomer.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology) Section cross-reference(s): 38, 76

ST fuel cell **electrolyte** perfluoroalkylsulfonylimide ionomer **membrane**; **proton** cond Nafion fuel cell electrolyte

IT Imides (bis[(perfluoroalkyl)sulfonyl]; **proton** conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane)

IT Polyoxyalkylenes, uses (fluorine- and sulfo-containing, ionomers; **proton** conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide

ionomer membrane)

IT Polyoxyalkylenes, uses  
(fluorine-containing, sulfo-containing, ionomers; **proton** conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane)

IT Fluoropolymers, uses  
Fluoropolymers, uses  
(polyoxyalkylene-, sulfo-containing, ionomers; **proton** conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane)

IT Ionomers  
(polyoxyalkylenes, fluorine- and sulfo-containing; **proton** conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane)

IT **Fuel cell electrolytes**  
(**proton** conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane)

IT Fluoropolymers, uses  
Ionomers  
(**proton** conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane)

IT Ionic conductivity  
(**proton; proton** conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane)

IT 66796-30-3, Nafion 117  
(**proton** conductivity in Nafion 117 and in a novel bis[(perfluoroalkyl)sulfonyl]imide ionomer membrane)

REFERENCE COUNT: 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L79 ANSWER 18 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 1997:443353 HCAPLUS Full-text  
 DOCUMENT NUMBER: 127:68582  
 TITLE: Processed sulfonic acid **polymer** for **proton-conducting electrolytic membranes** for fuel cells

INVENTOR(S): Yen, Shaio-ping S.; Narayanan, Sekharipuram R.; Halpert, Gerald; Graham, Eva; Yavrouian, Andre  
 PATENT ASSIGNEE(S): California Institute of Technology, USA; Yen, Shaio-Ping S.; Narayanan, Sekharipuram R.; Halpert, Gerald; Graham, Eva; Yavrouian, Andre  
 SOURCE: PCT Int. Appl., 45 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 9719480	A1	19970529	WO 1996-US18823	19961122

<--

W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN  
 RW: KE, LS, MW, SD, SZ, UG, AT, BE, CH, DE, DK, ES, FI, FR, GB,

09/936,148

GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA,  
GN, ML, MR, NE, SN, TD, TG

US 5795496	A	19980818	US 1995-561899	19951122
			<--	
CA 2238189	A1	19970529	CA 1996-2238189	19961122
			<--	
CA 2238189	C	20060829		
AU 9714068	A	19970611	AU 1997-14068	19961122
			<--	
EP 870340	A1	19981014	EP 1996-944201	19961122
			<--	
EP 870340	B1	20040421		
R: DE, FR, GB, IT, NL				
JP 2000501223	T	20000202	JP 1997-519946	19961122
			<--	
JP 3927601	B2	20070613		
PRIORITY APPLN. INFO.:			US 1995-561899	A 19951122
			<--	
			WO 1996-US18823	W 19961122
			<--	

ED Entered STN: 17 Jul 1997

AB The processed polymer has asym. properties. The preferred fuel-cell assembly includes an anode which is a **porous C** electrode including C/catalyst particles coated with the processed sulfonic acid polymer. The anode current collector includes carbon paper fiber impregnated with the processed polymer. **Proton-**conducting membrane adjoins the cathode. The **proton-**conducting membrane includes a dense surface of **proton-**conducting membrane facing the anode. The surface facing the cathode is preferably a very thin layer of crosslinked low **proton** -conducting surface.

IC ICM H01M008-10

ICS H01M008-22; C08J005-18

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

IT Polyketones

Polyketones

Polysulfones, uses

Polysulfones, uses

(polyether-, aromatic, sulfonated; processed sulfonic acid  
**polymer for proton-conducting**  
**electrolytic membranes for fuel cells)**

IT Polyethers, uses

Polyethers, uses

(polyketone-, aromatic, sulfonated; processed sulfonic acid  
**polymer for proton-conducting**  
**electrolytic membranes for fuel cells)**

IT Polyethers, uses

Polyethers, uses

(polysulfone-, aromatic, sulfonated; processed sulfonic acid  
**polymer for proton-conducting**  
**electrolytic membranes for fuel cells)**

IT Fuel cell electrolytes

(processed sulfonic acid **polymer for proton-**  
**conducting electrolytic membranes for**

IT 25667-42-9D, sulfonated 31694-16-3D, PEEK, sulfonated  
(processed sulfonic acid **polymer for proton-**  
**conducting electrolytic membranes for**  
fuel cells)

L79 ANSWER 19 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1997:76907 HCAPLUS Full-text

09/936,148

DOCUMENT NUMBER: 126:92077  
 TITLE: Solid polymer electrolyte fuel cells  
 INVENTOR(S): Kondo, Ryuta; Aso, Tomomichi  
 PATENT ASSIGNEE(S): Matsushita Electric Ind Co Ltd, Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 10 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 08306375	A	19961122	JP 1995-105561	19950428

PRIORITY APPLN. INFO.: JP 1995-105561 19950428

ED Entered STN: 03 Feb 1997

AB The fuel cells have an ion **conductive** solid **polymer electrolyte membrane** held between a pair of electrodes and a means for supplying water for the **electrolyte membrane** integrated to the cells. The fuel cells may use **conductive porous** gas diffusion electrodes having hydrophobically treated grooves on the electrode side forming water supplying passages.

IC ICM H01M008-04

ICS H01M008-04; H01M008-02; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT **Fuel cell electrolytes**

Fuel cells

(structure of solid polymer electrolyte fuel cells with built in water supplying passages for **electrolyte membranes**)

L79 ANSWER 20 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1996:97375 HCAPLUS Full-text

DOCUMENT NUMBER: 124:150921

TITLE: Electrodes, their manufacture, and fuel cells thereof

INVENTOR(S): Mizuno, Seiji

PATENT ASSIGNEE(S): Toyota Motor Co Ltd, Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 10 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 07326361	A	19951212	JP 1994-142473	19940531

PRIORITY APPLN. INFO.: JP 1994-142473 19940531

ED Entered STN: 16 Feb 1996

AB The electrodes are composed of a **conductive gas permeable substrate** and a water absorbing material. The water absorbing material is particles or short fibers of a water absorbing **polymer** or an inorg. compound, and is dispersed in the substrate or adhered to the substrate as a water absorbing sheet. The electrodes are prepared by mixing **conductive particles** or short fibers with particles or short fibers of the water absorbing material and press molding, or by impregnating **conductive gas permeable substrate** with the water absorbing

09/936,148

material. 'The fuel cells have a solid **polymer electrolyte membrane** held between a **cathode-anode** pair with at least the **cathode** having the above described structure.

IC ICM H01M004-86  
ICS H01M004-88; H01M008-02; H01M008-10  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
ST solid **polymer** electrolyte fuel cell **cathode**; water  
absorbing material fuel cell electrode  
IT Carbon fibers, uses  
(electrodes containing carbon fiber substrates and water absorbing  
**polymers** for solid **polymer** fuel cells)  
IT Electrodes  
(fuel-cell, electrodes containing carbon fiber substrates and water  
absorbing **polymers** for solid **polymer** fuel  
cells)  
IT 9003-01-4D, Poly(acrylic acid), salts  
(electrodes containing carbon fiber substrates and water absorbing  
**polymers** for solid **polymer** fuel cells)

L79 ANSWER 21 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 1995:677302 HCAPLUS Full-text  
DOCUMENT NUMBER: 123:64748  
TITLE: Dehumidifier using solid **polymer**  
**electrolyte membrane**

INVENTOR(S): Tanda, Shoji; Yoshioka, Takeo; Yamauchi, Shiro  
PATENT ASSIGNEE(S): Mitsubishi Electric Corp, Japan  
SOURCE: Jpn. Kokai Tokkyo Koho, 43 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	-----
JP 07068123	A	19950314	JP 1993-243639	19930903
			<--	
JP 2998120	B2	20000111		
PRIORITY APPLN. INFO.:			JP 1993-243639	19930903
			<--	

ED Entered STN: 15 Jul 1995

AB The dehumidifier includes a box container having ≥1 surface attached with a dehumidification element having solid **polymer electrolyte membrane** between **anode** and **cathode**, and a pipe arranged in a passage hole on the **surface** for connecting upper and lower portions of the container.

IC ICM B01D053-26  
CC 59-6 (Air Pollution and Industrial Hygiene)  
ST air conditioning dehumidifier **electrolyte membrane**  
IT Air conditioning  
(dehumidifier using solid **polymer electrolyte**  
**membrane**)

L79 ANSWER 22 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 1989:615722 HCAPLUS Full-text  
DOCUMENT NUMBER: 111:215722  
TITLE: Aromatic **polymer** membranes and their  
preparation by electrolytic oxidative  
**polymerization**

INVENTOR(S): Hayashida, Shoichi; Sukegawa, Takeshi  
PATENT ASSIGNEE(S): Nippon Telegraph and Telephone Public Corp., Japan

09/936,148

SOURCE: Jpn. Kokai Tokkyo Koho, 7 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 01123743	A	19890516	JP 1987-282185	19871110

PRIORITY APPLN. INFO.: JP 1987-282185 19871110  
 <--

ED Entered STN: 09 Dec 1989

AB Title membranes, useful for electrochronog. display, etc., are prepared by impregnating aromatic compound monomers in fibrous or **porous substrates** and forming **polymer membranes** by **electrolytic** oxidation in electrolyte solns. Filter paper was dipped in a 0.1 M pyrene solution in acetonitrile; drying, repeating 10 times, vacuum depositing a Li trifluoromethanesulfonate-polyoxyethylene mixture on 1 side, and sandwiched between 2 glass plates gave a display device having browning property by applying 3.0 V d.c. by **cathode** on the filter-side and the **anode** on the electrolyte side for 7 min, and discoloring by applying -3.0 V.

IC ICM B32B027-12

ICS B32B005-02; B32B005-08; D06M015-00; D21H005-00

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 76

IT **Polymerization**

(electrochem., oxidative, of aromatic compound monomers, for electrochronog. display devices)

IT Optical imaging devices

(electrochromic, of aromatic compound **polymers**, prepared by electrolytic oxidation)

L79 ANSWER 23 OF 67 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1984:54588 HCAPLUS Full-text

DOCUMENT NUMBER: 100:54588

TITLE: Fuel cell

PATENT ASSIGNEE(S): Hitachi, Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 58165267	A	19830930	JP 1982-49805	19820326

PRIORITY APPLN. INFO.: JP 1982-49805 19820326  
 <--

ED Entered STN: 12 May 1984

AB The discharge performance of a fuel cell is increased by using a laminate of an electrolyte support and a conductive **porous anode substrate** with attached catalyst. Thus, a porous C paper with pore diameter smaller than the particle diameter (d) of an **anode** catalyst and prepared by using a **fluoropolymer** binder sprayed or attached with a powdered catalyst was press-laminated with an ion-exchange **membrane electrolyte** support (with pore diameter smaller than d). A cell using the laminate and a conventional air **cathode** had an open-circuit



09/936,148

voltage of 0.44 V at .apprx.80 mA/cm2 and a c.d. of 60 mA/cm2 at 0.5 V vs. 0.42 V and 44 mA, resp., for a conventional cell.

IC H01M008-02  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
ST fuel cell **anode** electrolyte support.

=> d 24-36 full

L79 ANSWER 24 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN  
AN 2004-794679 [78] WPIX Full-text  
CR 1997-118279; 1997-320036; 2001-569840; 2002-215969; 2002-403098;  
2006-164313; 2006-612437  
DNC C2004-277365 [78]  
DNN N2004-626285 [78]  
TI **Fuel-cell**, e.g. liquid feed organic **fuel**  
**cell**, has fuel connection for circulating organic fuel that is  
free of acid electrolyte into contact with **anode**, and second  
connection for circulating air into contact with **cathode**  
DC A85; L03; X16  
IN FRANK H A; HALPERT G; NARAYANAN S R; OLAH G A; PRAKASH G K S;  
SURAMPUDI S; VAMOS E  
PA (FRAN-I) FRANK H A; (HALP-I) HALPERT G; (NARA-I) NARAYANAN S R;  
(OLAH-I) OLAH G A; (PRAK-I) PRAKASH G K S; (SURA-I) SURAMPUDI S;  
(VAMO-I) VAMOS E  
CYC 1  
PI US 20040224214 A1 20041111 (200478)\* EN 28[21]  
ADT US 20040224214 A1 Cont of US 1993-135007 19931012; US  
20040224214 A1 Div Ex US 1995-478801 19950607; US  
20040224214 A1 Cont of US 2001-881309 20010613; US 20040224214 A1 US  
2004-857587 20040527  
FDT US 20040224214 A1 Cont of US 5599638 A; US 20040224214 A1 Div ex US  
6248460 B  
PRAI US 2004-857587 20040527  
US 1993-135007 19931012  
US 1995-478801 19950607  
US 2001-881309 20010613  
IPCR H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-10 [I,A]; H01M0008-10  
[I,C]; H01M0008-22 [I,A]; H01M0008-22 [I,C]  
AB US 20040224214 A1 UPAB: 20050707  
NOVELTY - A **fuel-cell** (10) includes electrodes including **anode** (14) and  
**cathode** (16); electrolyte (18); fuel connection for circulating an organic  
fuel which is free of acid electrolyte into contact with the **anode**; and second  
connection for circulating air into contact with a **cathode**. The electrode(s)  
includes a structure that is capable of wetting the organic fuel.  
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for the  
following:  
(1) forming a **fuel-cell** by obtaining a backing material for use in  
forming an **anode** structure; forming an additive within the **anode** that promotes  
uniform wetting of the **anode**; adding an electro-catalyst to the **anode**;  
attaching the **anode** to a solid membrane that includes an electrolyte and  
attaching the **electrolyte membrane** to a **cathode**; and carrying out a chemical  
reaction by flowing organic fuel that is free of acid electrolyte into contact  
with the **anode**;  
(2) operating a **fuel-cell** by circulating an organic fuel that is free  
of an acid electrolyte fuel to an **anode**; circulating air to a **cathode** to allow  
an electrochemical reaction that produces electricity and also produces an  
output product including water and gas; and separating the gas from water in  
the output product; and

(3) method comprising carrying out an electrochemical reaction in a **fuel-cell** by introducing an organic fuel that is free of acid electrolyte into an area of an **anode**, to carry out a chemical reaction that produces electricity and releases water and gas; and separating water from gas in an area of the **cathode**, and reintroducing recovered water into an area of the **anode**.

USE - Used as liquid feed organic **fuel cell** .

ADVANTAGE - The liquid feed **fuel cell** does not require a sulfuric acid electrolyte.

DESCRIPTION OF DRAWINGS - The figure is a schematic view of improved liquid feed organic **fuel cell** having solid polymeric membrane.

**Fuel cell** (10)

Housing (12)

**Anode** (14)

**Cathode** (16)

Electrolyte (18)

Pump (20)

Port (24, 30)

Compressor (26)

**Cathode chamber** (28)

TECH ELECTRICAL POWER AND ENERGY - Preferred Component: The **cathode** is a gas diffusion electrode. It includes a platinum containing catalyst. It is formed on a carbon backing paper to which the catalyst is formed at a loading 0.5-4 mg/cm. The electrolyte is a **proton conducting solid polymer** electrolyte sandwiched between the **anode** and the **cathode**. It is formed to have a water content to reduce permeability of the fuel to cross over between **anode** and **cathode**. The electrode(s) is the **porous anode**. The structure is an additive that promotes uniform wetting of **pores** within the **anode**. The additive is an ionomeric additive.

The **fuel cell** also includes a water recirculation system recovering water from a by-product of the **fuel cell**, and gas separator operating to receive an output product from the **fuel cell** and to separate gas within the output product from liquid within the output product. It may include recovery unit that recovers water from the output product. The gas separator operates to allow gas from the output product to accumulate in and to vent the gas. It includes microporous material or material which allows passage of gas but does not allow passage of water. It is a static system that allows gas bubbles to rise vertically towards a vent. It includes heat exchanger that causes liquid to fall. The **cathode** is a gas diffusion **cathode** with electro-catalyst particles. It is treated with hydrophobic material that aids in removal of water. It contains material at a loading that is effective to create a three-phase boundary. The water recirculation system includes a carbon dioxide and water exchanger that separates carbon dioxide from water. The **anode**, **cathode**, and electrolyte are formed into a composite layered structure. Preferred Method: The additive is formed by impregnating with an ionomeric additive at 2-10 wt.% of the electro-catalyst. ORGANIC CHEMISTRY - Preferred Component: The fuel is a methanol-containing fuel. POLYMERS - Preferred Component: The hydrophobic material is Teflon. Preferred Composition: The **cathode** contains 10-50 wt.% Teflon. The electrolyte is a perfluorinated sulfonic acid polymer membrane.

FS

CPI; EPI

MC

CPI: A12-E06; L03-E04A2

EPI: X16-C01; X16-C01C; X16-E06

L79 ANSWER 25 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN  
 AN 2004-448283 [42] WPIX Full-text  
 CR 2001-380681; 2002-598448  
 DNC C2004-168218 [42]  
 DNN N2004-354588 [42]  
 TI Fuel cell for use in power plant as power source for both stationary and mobile applications, includes support plate(s) containing hydrophilic **substrate** layer having **pores**  
 DC A14; A17; A85; L03; X16  
 IN BEKKEDAHL T A; BREGOLI L J; CIPOLLINI N E; PATTERSON T W; PEMBERTON M; PUHALSKI J; REISER C A; SAWYER R D; STEINBUGLER M M; YI J S  
 PA (BEKK-I) BEKKEDAHL T A; (BREG-I) BREGOLI L J; (CIPO-I) CIPOLLINI N E; (PATT-I) PATTERSON T W; (PEMB-I) PEMBERTON M; (PUHA-I) PUHALSKI J; (REIS-I) REISER C A; (SAWY-I) SAWYER R D; (STEI-I) STEINBUGLER M M; (YIJS-I) YI J S  
 CYC 1  
 PI US 20040106034 A1 20040603 (200442)\* EN 23[12]  
 ADT US 20040106034 A1 CIP of US 1999-466701 19991217; US 20040106034 A1 Cont of US 2001-12157 20011128; US 20040106034 A1 US 2003-722946 20031126  
 PRAI US 2003-722946 20031126  
 US 1999-466701 19991217  
 US 2001-12157 20011128  
 IPCR H01M0008-04 [I,A]; H01M0008-04 [I,C]; H01M0008-10 [I,A]; H01M0008-10 [I,C]  
 AB US 20040106034 A1 UPAB: 20050530  
 NOVELTY - A fuel cell (12) includes an anode support plate, a cathode support plate, and a membrane electrode assembly (MEA) disposed between the anode and cathode support plates. The membrane electrode assembly contains polymer **electrolyte member**. The support plates have hydrophilic **substrate** layer having **pores**.  
 DETAILED DESCRIPTION - A fuel cell comprises an anode support plate, a cathode support plate, and MEA disposed between the anode and cathode support plates. The MEA comprises a polymer electrolyte membrane. The support plates comprise a hydrophilic **substrate** layer having **pores**. A water transport plate is adjacent to the hydrophilic substrate layer. The water transport plate has passageways for a water stream and a reactant gas stream (22, 24). A partially hydrophobic porous carbon fluoro polymer particulate composite diffusion layer is disposed between the hydrophilic substrate layer and the membrane electrode assembly. The diffusion layer comprises 10 weight% fluoro polymer.  
 USE - For use in power plant (10) as power source for both stationary and mobile applications.  
 ADVANTAGE - The hydrophilic substrate layer improves the electrical power output capacity, increases oxygen utilization, and operational efficiency of the fuel cell.  
 DESCRIPTION OF DRAWINGS - The figure illustrates a fuel cell power plant including a proton exchange membrane fuel cell and a controller for controlling the pressure of the reactant gas streams and the coolant stream.  
 Power plant (10)  
 Fuel cell (12)  
 Reactant gas stream (22, 24)  
 Coolant stream (26)  
 TECH ELECTRICAL POWER AND ENERGY - Preferred Component: The fuel cell includes a mechanism for creating pressure differential between the reactant gas streams and a coolant stream (26) so that the pressure of the reactant gas stream is greater than the pressure of the coolant stream.  
 Preferred Parameter: The diffusion layer is more than 5 but less than

25 micrometers thick. The pressure differential is more than 0.2 but less than 1.7 psi.

POLYMERS - Preferred Material: The fluoro polymer of the diffusion layer is polytetrafluoroethylene, fluorinated ethylene propylene, polytetrafluoroethylene-co-perfluoromethyl vinyl ether, copolymers of ethylene and tetrafluoroethylene, copolymers of ethylene and chlorotrifluoroethylene, polyvinylidene fluoride, polyvinyl fluoride, or amorphous fluoropolymers.

FS CPI; EPI

MC CPI: A04-E10; A12-E06; L03-E04A2; L03-E04B

EPI: X16-C01C; X16-E06A

L79 ANSWER 26 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2001-146763 [15] WPIX Full-text

DNC C2001-043346 [15]

DNN N2001-107462 [15]

TI High **proton conductance**, solid **polymer electrolyte membrane** for use in a **proton**-exchange membrane **fuel cell** comprises a sulfonated phosphazene polymer which is chemically or physically cross-linked

DC A26; A85; L03; W06; X16

IN PINTAURO P N; TANG H

PA (TULA-C) TULANE EDUCATIONAL FUND

CYC 88

PI WO 2000072395 A2 20001130 (200115)\* EN 49[6]

AU 2000070495 A 20001212 (200115) EN

US 6365294 B1 20020402 (200226) EN

ADT WO 2000072395 A2 WO 2000-US11901 20000428; US 6365294 B1 US 1999-302879 19990430; AU 2000070495 A AU 2000-70495 20000428

FDT AU 2000070495 A Based on WO 2000072395 A

PRAI US 1999-302879 19990430

IPCR C08J0005-20 [I,C]; C08J0005-22 [I,A]; H01M0008-10 [I,A]; H01M0008-10 [I,C]

AB WO 2000072395 A2 UPAB: 20050525

NOVELTY - A high **proton conductance**, solid **polymer electrolyte membrane** comprises a sulfonated phosphazene polymer which is chemically or physically cross-linked.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a hydrogen or direct liquid-feed methanol **fuel cell** comprising an **anode**, **cathode** and sulfonated phosphazene polymer **electrolyte membrane** operating in a hydrated state.

USE - The membrane is used in **proton-exchange membrane fuel cells**, e.g. hydrogen/oxygen and direct liquid-feed methanol **fuel cells**, as power generators for terrestrial and space applications.

ADVANTAGE - The membrane has a high **proton** conductance and low water and methanol permeation rates.

TECH POLYMERS - Preferred Components: The sulfonated phosphazene polymer comprises (alkyl)phenoxy side chains (preferably 3-methylphenoxy). The alkylphenoxy side chains contain sulfonic acid fixed-charge groups to impart an ion-exchange capacity (IEC) of 0.8-1.9 mmol/g of dry polymer. The phosphazene polymer may also comprise a blend of sulfonated poly(bis(3-methylphenoxy)phosphazene) and a high glass-transition temperature polymer that can be polyimide or polyetherimide (preferably poly(bisphenol A-co-4-nitrophthalic anhydride-co-1,3-phenylenediamine)). Preferred Method: The chemical cross-links are formed between the main chains of the sulfonated phosphazene polymer, or in the dry polymer film by an ultraviolet (UV) light and a photoinitiator or by a gamma-radiation. The physical cross-links are created by blending the

sulfonated phosphazene polymer with a non-sulfonated polymer(s). The membrane can be formed from a casting solution consisting of sulfonated phosphazene polymer and the monomer constituent of the high glass-transition temperature polymer. The membrane can be impregnated into a micro-porous membrane. Preferred Membrane: The membrane is poly(bis(3-methylphenoxy)phosphazene) having an ion-exchange capacity of 1.4 mmol/g dry polymer and is ultraviolet cross-linked using 15% benzophenone.

ORGANIC CHEMISTRY - Preferred Component: The photo-initiator is benzophenone having a concentration of 5-25 wt.%.

ABEX EXAMPLE - Two poly(bis(3-methylphenoxy)phosphazene), each having an IEC of 1.4-1.6 mmol/g and 0-1 mmol/g were dissolved separately in N,N-dimethylacetamide (2-10 wt.%). The solution was stirred at 40-50degreesC for 24 hours. Specified amount of high and low IEC polymer/dimethylacetamide solutions were combined and stirred at 40-50degreesC for 10 hours. - The resulting solution was spread on a clean and flat surface and the solvent was evaporated at 60-70degreesC for 2-3 days to obtained proton-exchange membrane. After complete solvent removal, the membrane was exposed to ultraviolet (UV) light to react all of the photoinitiator.

FS CPI; EPI

MC CPI: A10-E12A; A11-C02B; A12-E06B; L03-E04

EPI: W06-B03B; X16-C01C; X16-J01A

L79 ANSWER 27 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2000-350279 [30] WPIX Full-text

CR 1999-190524; 2000-387037; 2005-180059

DNC C2000-106477 [30]

DNN N2000-262483 [30]

TI Composite solid polymer electrolyte membrane for electrochemical applications, has porous polymer substrate interpenetrated with an ion-conducting material

DC A13; A14; A28; A85; D15; E36; J01; J03; L03; X16; X25

IN FORMATO R M; KOVAR R F; LANDRAU N; OSEAR P; RUBIN L S

PA (FOSV-C) FOSTER-MILLER INC

CYC 81

PI WO 2000022684 A2 20000420 (200030)\* EN 95[2]

AU 2000023415 A 20000501 (200036) EN

EP 1116292 A2 20010718 (200142) EN

JP 2003528420 W 20030924 (200365) JA 93

ADT WO 2000022684 A2 WO 1999-US19476 19990826; EP 1116292 A2

EP 1999-967058 19990826; EP 1116292 A2 WO 1999-US19476

19990826; JP 2003528420 W WO 1999-US19476 19990826; AU

2000023415 A AU 2000-23415 19990826; JP 2003528420 W JP

2000-576501 19990826

FDT AU 2000023415 A Based on WO 2000022684 A; EP 1116292 A2 Based on WO 2000022684 A; JP 2003528420 W Based on WO 2000022684 A

PRAI US 1999-261349 19990303

WO 1998-US17898 19980828

IC ICM H01B001-06

ICI B29L007:00

IPCR B01D0067-00 [I,A]; B01D0067-00 [I,C]; B01D0069-00 [I,C]; B01D0069-12 [I,A]; B01D0069-14 [I,A]; B01D0071-00 [I,C]; B01D0071-32 [I,A]; B01D0071-38 [I,A]; B01D0071-52 [I,A]; B01D0071-56 [I,A]; B01D0071-62 [I,A]; B01D0071-64 [I,A]; B01D0071-66 [I,A]; B01D0071-68 [I,A]; B01D0071-82 [I,A]; B29C0041-00 [I,C]; B29C0041-24 [I,A]; B29L0007-00 [N,A]; C02F0001-44 [I,A]; C02F0001-44 [I,C]; C08J0005-18 [I,A]; C08J0005-18 [I,C]; C08J0005-20 [I,C]; C08J0005-22 [I,A]; C08L0101-00 [I,C]; C08L0101-12 [I,A]; H01B0001-06 [I,A]; H01B0001-06 [I,C]; H01B0013-00 [I,A]; H01B0013-00 [I,C]; H01M0002-16 [I,A]; H01M0002-16

[I,C]; H01M0006-18 [I,A]; H01M0006-18 [I,C]; H01M0008-02 [I,A];  
H01M0008-02 [I,C]; H01M0008-10 [I,A]; H01M0008-10 [I,C]

AB WO 2000022684 A2 UPAB: 20060116

NOVELTY - A composite solid polymer **electrolyte membrane** (SPEM) comprises a **porous polymer substrate** interpenetrated with an ion-conducting material. The SPEM is at least thermally stable at 100 degreesC.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for:

- (A) a method of producing a composite SPEM;
- (B) a device comprising a composite SPEM; and
- (C) a method of decreasing methanol crossover rate in a fuel cell using a SPEM.

The method (A) comprises:

(a) preparing a mixture of a polymer substrate and an ion-conducting material in a common solvent, and casting or extruding a composite membrane directly from the mixture;

(b) performing a sulfonation reaction within the pores of a polymer substrate;

(c) solubilizing the ion-conducting polymer and imbibing the **porous polymer substrate** with the ion-conducting polymer; or

(d) preparing the polymer substrate and impregnating the substrate with monomers which are then polymerized in-situ for the SPEM.

USE - For fuel cell, e.g., direct methanol fuel cell or hydrogen fuel cell, system for membrane-based water electrolysis or chloralkali electrolysis, dialysis, electrodialysis, or electrolysis system, pervaporation or gas separation system, water splitting system for recovering acids and bases from waste water solutions, electrode separator in a battery (claimed).

ADVANTAGE - The SPEM have high ionic conductivity, high resistance to dehydration, high mechanical strength, chemical stability during oxidation and hydrolysis, low gas permeability to limit parasitic losses, and stability at elevated temperatures and pressures. It has an electronic conductivity that approaches zero, dimensional stability, and a membrane that is non-brittle in both dry and wet forms. The **electrolyte membrane** is resistant to methanol cross-over when used in a direct methanol fuel cell. The overall cost of producing SPEMs is lowered which makes commercialization of SPEFCs possible.

TECH POLYMERS - Preferred Component: The **porous polymer substrate** is a homopolymer or copolymer of liquid crystalline polymer, or solvent soluble thermoset or thermoplastic aromatic polymer. It comprises an extruded or cast film and a micro infrastructure interpenetrated with the ion-conducting material. The ion-conducting material comprises a homopolymer or copolymer of sulfonated, phosphonated or carboxylated ion-conducting aromatic polymer or perfluorinated ionomer. The lyotropic liquid crystalline polymer substrate is polybenzazole (PBZ) or polyaramid (PAR) polymer. The PBZ polymer substrate is a homopolymer or copolymer of polybenzoxazole (PBO), polybenzothiazole (PBT), or polybenzimidazole (PBI). The PAR is a homopolymer or copolymer of a polypara-phenylene terephthalamide (PPTA). The thermoset or thermoplastic aromatic polymer substrate is polysulfone (PSU), polyimide (PI), polyphenylene oxide (PPO), polyphenylene sulfoxide (PPSO), polyphenylene sulfide (PPS), polyphenylene sulfide sulfone (PPS/SO<sub>2</sub>), polyparaphenylene (PPP), polyphenyl quinoxaline (PPQ), polyaryleketone (PK), or polyetherketone (PEK). The PSU polymer substrate is polyethersulfone (PES), polyetherethersulfone (PEES), polyarylethersulfone (PAS), polyphenylsulfone (PPSU), or polyphenylenesulfone (PPSO<sub>2</sub>). The polyimide polymer is polyetherimide (PEI). The PEK polymer is PEK, polyetheretherketone (PEEK), polyetherketone-ketone (PEKK), polyetheretherketone-ketone (PEEKK), or polyetherketoneetherketone-ketone (PEKEKK). The PPO is 2,6-diphenyl PPO or 2,6 dimethyl PPO **polymer**. The ion-conducting material is a homopolymer or copolymer of at least one of a

sulfonated, phosphonated, or carboxylated polyimide. The sulfonated ion-conducting polymer is a sulfonated derivative that can be PSU, PPO, PPSO, PPS, polyphenylene sulfide sulfone (PPS/SO<sub>2</sub>), PPP, PPQ, PK, PEK, PBZ and PAR polymer. The ion-conducting material which is cross-linked can also be polystyrene sulfonic acid (PSSA), poly(trifluorostyrene) sulfonic acid, polyvinyl phosphonic acid (PVPA), polyacrylic acid and polyvinyl sulfonic acid (PVSA) polymer.

Preferred Condition: The SPEM is stable at 100-175 degreesC preferably 100-150 degreesC (preferably at 120-175 degreesC). The SPEM has a specific resistance of 0.02-20 OMEGAcm<sup>2</sup> (preferably less than 0.2 OMEGAcm<sup>2</sup>) and a thickness of 0.1-5 mil (preferably 1 mil). The pore size of the polymer substrate is 10-20,000 Angstrom (preferably 500-10000 Angstrom). The ion conducting material has an ion-conductivity of 0.01- 0.5 S/cm (preferably 0.1 S/cm). The PBZ polymer is preferably a polybenzoxazole polymer.

ORGANIC CHEMISTRY - Preferred Component: The perfluorovinyl ether sulfonic acid is carboxylic, phosphonic, or sulfonic substituted.

ABEX EXAMPLE - Microporous PBO, having been exchanged into N-methyl-2-pyrrolidinone (NMP) without collapse of the pores, was added to a 5 wt. % solution of the sulfonated Radel (sodium plus form) polymers in NMP. After at least 12 hour, the films were removed and placed in a 20 wt. % solution of the same ion-conducting polymer (also in NMP). After at least 12 hours at room temperature (or at 75 degreesC), the films were removed, stretched, and dried of the solvent. The sulfonated Radel/PBO films were dried in a low humidity chamber (less than 5% relative humidity) for 1-2 days, vacuum dried in an oven at 60-200 degreesC. The composite is hot pressed after all the solvent is fully extracted. Non-porous Teflon shims were placed on each side of the composite membrane followed by titanium shims. The entire set-up is then loaded into a press and subjected to different temperature, pressure, holding time, force, and ramp rate to produce the SPEM.

FS CPI; EPI

MC CPI: A10-B01; A10-D; A10-E12A; A11-B04; A11-B05; A12-E01; A12-M02;  
A12-W11A; D04-A; D04-A01E; E11-N; E31-A02; E31-B01; E31-D01;  
J01-C03B; J03-B04; J03-D; L03-E01A; L03-E04  
EPI: X16-C01A; X16-C01C; X16-F02; X25-R01

L79 ANSWER 28 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2001-113311 [13] WPIX Full-text

DNC C2001-033851 [13]

DNN N2001-083147 [13]

TI Fuel cell has a thermoplastic polymer electrolyte membrane separating the anode and cathode chambers of a cell

DC A11; A14; A26; A85; L03; X16

IN BIEGERT H; BRITZ P; LAMM A; TOTH G; URBAN P

PA (BALL-N) BALLARD POWER SYSTEMS INC; (DAIM-C) DAIMLERCHRYSLER AG

CYC 21

PI DE 19926353 A1 20001214 (200113)\* DE 6[4]

WO 2000077873 A1 20001221 (200113) DE

EP 1198858 A1 20020424 (200235) DE

US 6706435 B1 20040316 (200420) EN

EP 1198858 B1 20060301 (200617) DE

DE 50012317 G 20060427 (200629) DE

ADT DE 19926353 A1 DE 1999-19926353 19990610; EP 1198858 A1 EP 2000-938731 20000602; EP 1198858 B1 EP 2000-938731 20000602; WO 2000077873 A1 WO 2000-EP5052 20000602; EP 1198858 A1 WO 2000-EP5052 20000602; US 6706435 B1 WO 2000-EP5052 20000602; EP 1198858 B1 WO

2000-EP5052 20000602; US 6706435 B1 US 2002-9342 20020408; DE 50012317  
G DE 2000-512317 20000602; DE 50012317 G EP 2000-938731 20000602; DE  
50012317 G WO 2000-EP5052 20000602

FDT EP 1198858 A1 Based on WO 2000077873 A; US 6706435 B1  
Based on WO 2000077873 A; EP 1198858 B1 Based on WO 2000077873  
A; DE 50012317 G Based on EP 1198858 A; DE 50012317 G  
Based on WO 2000077873 A

PRAI DE 1999-19926353 19990610

IPCI H01M0008-10 [I,A]; H01M0008-10 [I,A]; H01M0008-10 [I,C]

IPCR H01M0008-10 [I,A]; H01M0008-10 [I,C]

AB DE 19926353 A1 UPAB: 20050901

NOVELTY - **Fuel cell** comprises a cell with a **proton-conducting polymer electrolyte membrane** that separates the **anode** chamber and the **cathode** chamber of the cell. The membrane is made of a thermoplastic polymer having a continuous use temperature of at least 100degrees C.

USE - Used as a polymer-**electrolyte-membrane fuel cell**.

ADVANTAGE - A carbon monoxide content of up to 2 volume% is possible without resorting to additional purification measures.

TECH POLYMERS - Preferred Membrane: The membrane is formed of an asymmetric polymer. The membrane has a covering layer made of a thermoplastic polymer supported by a polymeric supporting structure. The supporting structure has **pores** vertical to the covering layer, the **pore** diameter extending from the covering layer. The covering layer has a thickness of 1-50 mum. The supporting structure has a thickness of 10-500 mum. The thermoplastic polymer is made of polysulfone, polyethersulfone, cellulose acetate, polyacrylonitrile, polyetheretherketone, polyimide or polybenzimidazole. The thermoplastic polymer additionally has radiation-induced defects and/or functional groups to increase the ion conductivity. A catalyst material is inserted into the supporting structure.

FS CPI; EPI

MC CPI: A12-E06B; L03-E04

EPI: X16-C01C; X16-F02; X16-J01A

L79 ANSWER 29 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 2000-657211 [64] WPIX Full-text

DNC C2000-198944 [64]

DNN N2000-487218 [64]

TI Hybrid energy generating system, e.g. for an electric vehicle, is divided by a semi-**permeable**, carbon-doped and surface-modified filter membrane forming a gas diffusion membrane

DC A26; A85; L03; X16; X21

IN KUEHN A

PA (KUEH-I) KUEHN A

CYC 1

PI DE 19912757 A1 20000928 (200064)\* DE 10[4]

ADT DE 19912757 A1 DE 1999-19912757 19990322

PRAI DE 1999-19912757 19990322

IPCR H01M0004-86 [I,A]; H01M0004-86 [I,C]; H01M0008-04 [I,A]; H01M0008-04 [I,C]; H01M0008-08 [I,A]; H01M0008-08 [I,C]

AB DE 19912757 A1 UPAB: 20050831

NOVELTY - An energy generating system divided by a semi- **permeable**, carbon-doped and surface organic- or metallic-modified filter membrane forming a gas diffusion membrane is new.

DETAILED DESCRIPTION - An energy generating process and apparatus employ a system which is divided by a semi-**permeable** , carbon-doped and surface organic- or metallic-modified filter **membrane** forming an **electrolyte-impermeable** gas diffusion membrane.

The apparatus contains an acid electrolyte between its electrodes and is in the form of a hybrid system in which electrical efficiency is increased



by coupling with other energy conversion processes so as to form a hot air/**fuel cell** hybrid system.

The conversion process for producing electrical energy from chemical energy is carried out at well below the ignition, flame and combustion temperatures of the operating medium during the entire oxidation reaction.

Preferred Features: The membrane has mixed phases produced from dopants with carbon black, ceramics or electrically **conductive polymeric** materials and may consist of silica which is surface modified with e.g. siloxanes.

USE - As an energy generating process and apparatus employing a catalyst of the type described in DE19627924 as support structure, e.g. in an electric vehicle.

ADVANTAGE - The process and apparatus allow coupling of various energy conversion processes, e.g. coupling of direct production of water and electrical current from hydrogen and oxygen in a phosphoric acid **fuel cell** with a waste heat utilization system, in a single operation without use of moving parts.

DESCRIPTION OF DRAWINGS - The drawing shows a schematic perspective view of a energy generating mono-cell for use in the energy generating process and apparatus of the invention.

Electrolyte (1)

Anode (2)

Cathode (3)

Individual cells (4, 5)

Porous gas diffusion walls (6)

TECH POLYMERS - The electrically **conductive polymeric** materials may be polyaniline, polycations, polyanions or polyzwitterions.

FS CPI; EPI

MC CPI: A05-J11; A09-A03; A12-E06B; A12-T04C; L03-E04; L03-E05; L03-H05

EPI: X16-C04; X16-F02; X21-A01F; X21-B01A

L79 ANSWER 30 OF 67 WPIX COPYRIGHT 2007

THE THOMSON CORP on STN

AN 1999-190524 [16] WPIX Full-text

CR 2000-350279; 2000-387037; 2005-180059

DNC C1999-056069 [16]

DNN N1999-139368 [16]

TI Composite solid polymer **electrolyte membrane** comprising porous polymer

DC A28; A85; L03; P42; P73; X16

IN FORMATO R M; KOVAR R F; LANDRAU N; OSENAR P; RUBIN L S

PA (FORM-I) FORMATO R M; (FOSV-C) FOSTER-MILLER INC; (KOVA-I) KOVAR R F; (LAND-I) LANDRAU N; (OSEN-I) OSENAR P

CYC 80

PI WO 9910165 A1 19990304 (199916)\* EN 69[2]

<--

AU 9892101 A 19990316 (199930) EN

<--

EP 1021296 A1 20000726 (200037) EN

US 6248469 B1 20010619 (200137) EN

JP 2001514431 W 20010911 (200167) JA 75

US 20020045085 A1 20020418 (200228) EN

US 7052793 B2 20060530 (200636) EN

ADT WO 9910165 A1 WO 1998-US17898 19980828; US 6248469 B1

Provisional US 1997-57233P 19970829; US 20020045085 A1

Provisional US 1997-57233P 19970829; AU 9892101 A AU

1998-92101 19980828; EP 1021296 A1 EP 1998-944594

19980828; EP 1021296 A1 WO 1998-US17898 19980828; US

6248469 B1 CIP of WO 1998-US17898 19980828; JP 2001514431 W

WO 1998-US17898 19980828; US 6248469 B1 US 1999-261349

19990303; US 20020045085 A1 Div Ex US 1999-261349

19990303; JP 2001514431 W JP 2000-507525 19980828; US  
 20020045085 A1 US 2000-750402 20001228; US 7052793 B2 Provisional  
 US 1997-57233P 19970829; US 7052793 B2 Div Ex US  
 1999-261349 19990303; US 7052793 B2 US 2000-750402 20001228

FDT US 20020045085 A1 Div ex US 6248469 A; AU 9892101 A Based  
 on WO 9910165 A; EP 1021296 A1 Based on WO 9910165 A;  
 JP 2001514431 W Based on WO 9910165 A; US 7052793 B2 Div  
 ex US 6248469 B

PRAI US 1997-57233P 19970829  
 WO 1998-US17898 19980828  
 US 1999-261349 19990303  
 US 2000-750402 20001228

IC ICM H01M008-02

IPCI H01M0008-10 [I,A]; H01M0008-10 [I,C]

IPCR B01D0067-00 [I,A]; B01D0067-00 [I,C]; B01D0069-00 [I,C]; B01D0069-14  
 [I,A]; B01D0071-00 [I,C]; B01D0071-32 [I,A]; B01D0071-52 [I,A];  
 B01D0071-56 [I,A]; B01D0071-62 [I,A]; B01D0071-64 [I,A]; B01D0071-66  
 [I,A]; B01D0071-68 [I,A]; B01D0071-82 [I,A]; C08J0005-20 [I,C];  
 C08J0005-22 [I,A]; C08J0007-00 [I,C]; C08J0007-16 [I,A]; C08J0009-00  
 [I,C]; C08J0009-28 [I,A]; H01M0002-16 [I,A]; H01M0002-16 [I,C];  
 H01M0008-02 [I,A]; H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-02  
 [I,C]; H01M0008-10 [I,A]; H01M0008-10 [I,C]

AB WO 1999010165 A1 UPAB: 20060115

NOVELTY - The membrane comprises a **porous polymer substrate** interpenetrated  
 with an ion conducting material and is thermally stable up to 100 degrees C.

USE - The membrane is used in a fuel cell, e.g. a direct methanol fuel  
 cell or a hydrogen / air fuel cell used to supply power to an electronic  
 device, or in water electrolysis, chloralkali electrolysis, dialysis or  
 electrodialysis, pervaporation, gas separation, recovering acids and bases  
 from waste water or as an electrode separator in a battery.

ADVANTAGE - The membrane decreases the methanol crossover rate in a  
 fuel cell and has a methanol permeation rate of less than 0.01 cc/sec in a  
 direct methanol fuel cell.

TECH POLYMERS - Preferred **Substrate**: The **porous polymer**  
**substrate** comprises a lyotropic liquid crystalline polymer,  
 e.g. a polybenzoxazole, polybenzothiazole, polybenzimidazole or  
 polyaramid, e.g. poly(p-phenylene terephthalamide), or a solvent  
 soluble thermoset or thermoplastic aromatic polymer, e.g. a  
 polysulfone, polyethersulfone, polyetherethersulfone,  
 polyarylethersulfone, polyphenylsulfone, polyphenylsulfone, polyimide,  
 polyetherimide, polyphenylene oxide, polyphenylene sulfoxide,  
 polyphenylene sulfide, polyphenylene sulfide sulfone,  
 poly-p-phenylene, polyphenyl-quinoxaline, polyarylketone,  
 polyetherketone, polyether-ether ketone or polyetherketoneketone. The  
 pore size of the substrate polymer is 50-150nm.  
 Preferred Material: The ion conducting material is a sulfonated,  
 phosphonated or carboxylated aromatic polymer, e.g. a sulfonated,  
 phosphonated or carboxylated polyimide or fluoropolyimide,  
 polystyrene-sulfonic acid, poly(trifluorostyrene)sulfonic acid,  
 polyvinyl-phosphonic acid, polyacrylic acid or polyvinylsulfonic acid,  
 or a sulfonated thermoset or thermoplastic aromatic polymer as listed  
 above, or a perfluorinated ionomer, e.g. a carboxyl-, phosphonyl- or  
 sulfonyl-substituted poly(perfluorinated vinyl ether) and has an ion  
 conductivity of 0.1-0.5 S/cm. The membrane is prepared by extrusion or  
 casting a mixture in a common solvent. Alternatively the  
**porous polymer substrate** can be impregnated with a  
 solution of the ion **conducting polymer** or with  
 monomers which are polymerized to produce the ion **conducting**  
**polymer**. The membrane is 0.1-0.5 mil thick and has a specific  
 resistance of 0.2-20 ohm sq.cm.

ABEX EXAMPLE - Microporous polybenzoxazole film soaked with N-methylpyrrolidone (NMP) was added to a 5 wt.% solution of a 100% sulfonated polyether sulfone in NMP. After 12 hours the film was removed and placed in a 20 wt.% solution of the sulfonated polysulfone in NMP. After 12 hours, the film was removed, stretched in tensioning rings and dried at 5% humidity for 2 days then vacuum dried in an oven at up to 200 degreesC. The composite was hot pressed at 200 degreesC for 5 minutes. The membrane produced had resistance 5.1 ohm sq.cm.

FS CPI; GMPI; EPI

MC CPI: A12-E06B; L03-E01A; L03-E04

EPI: X16-C; X16-C16

L79 ANSWER 31 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 1998-534190 [46] WPIX Full-text

DNC C1998-160319 [46]

DNN N1998-416841 [46]

TI Polymer electrolyte fuel cell providing stable power generation - having a current collector including a thin **porous substrate** and a hydrophilic material, which maintains reliable gas permeability and cell voltage

DC A14; A17; A85; L03; X16

IN HAMADA A; HAMADA A K; KANEKO M; MIYAKE Y; TANIGUCHI S

PA (SAOL-C) SANYO ELECTRIC CO LTD

CYC 28

PI EP 872907 A1 19981021 (199846)\* EN 34[9]

<--

JP 10289723 A 19981027 (199902) JA 9

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CA 2234691 A 19981011 (199912) EN

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KR 98081284 A 19981125 (200005) KO [11]

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US 6083638 A 20000704 (200036) EN

KR 374281 B 20030421 (200355) KO

EP 872907 B1 20040630 (200444) EN

DE 69824784 E 20040805 (200451) DE

JP 3583897 B2 20041104 (200472) JA 13

CA 2234691 C 20050111 (200506) EN

DE 69824784 T2 20050721 (200548) DE

ADT EP 872907 A1 EP 1998-106750 19980414; JP 10289723 A JP 1997-94180 19970411; JP 3583897 B2 JP 1997-94180 19970411; KR 98081284 A KR 1998-12751 19980410; KR 374281 B KR 1998-12751 19980410; US 6083638 A US 1998-58703 19980410; CA 2234691 A CA 1998-2234691 19980414; CA 2234691 C CA 1998-2234691 19980414; DE 69824784 E DE 1998-69824784 19980414; DE 69824784 T2 DE 1998-69824784 19980414; DE 69824784 E EP 1998-106750 19980414; DE 69824784 T2 EP 1998-106750 19980414

FDT DE 69824784 E Based on EP 872907 A; DE 69824784 T2 Based on EP 872907 A; JP 3583897 B2 Previous Publ JP 10289723 A; KR 374281 B Previous Publ KR 98081284 A

PRAI JP 1997-94180 19970411

IC ICM H01M008-00; H01M008-10

ICS H01M004-86

IPCR H01M0004-66 [I,A]; H01M0004-66 [I,C]; H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-04 [N,A]; H01M0008-04 [N,C]; H01M0008-06 [I,A]; H01M0008-06 [I,C]; H01M0008-10 [I,A]; H01M0008-10 [I,C]; H01M0008-24 [N,A]; H01M0008-24 [N,C]

AB EP 872907 A1 UPAB: 20060114

A fuel cell comprises: (A) a cell including an **electrolyte member** positioned between an anode layer and a cathode layer; (B) a pair of current collectors, each contacting one of the electrode layers, wherein one collector(s) includes (a) a thin **porous substrate** and (b) a hydrophilic material, wherein (b) is provided either to holes of (a) or to surfaces of skeleton elements of (a), so that hydrophilic areas formed by (b) successively pass through (a) between both surfaces of (a); (C) a first channel member which includes channels which face the anode layer with one of the pair of current collectors in between; and (D) a second channel member which includes channels which face the cathode layer with the other one of the pair of current collectors in between, wherein the hydrophilic areas of the current collector(s) are exposed to channels of (C) and/or (D). Also claimed are: such a fuel cell in which, in (B), (b) is loaded into through openings which are established to pass through (a) between both surfaces of (a); a cell structure element, which is a structural unit of a power generation element of a fuel cell, comprising (A) and (B); a current collector comprising (a) and (b) as above; and a polymer electrolyte fuel cell comprising (A), (C), (D), and (B) in which the current collector(s) comprises (a), (b) and (c) a hydrophobic material, wherein both (b) and (c) are provided to either the holes of (a) or to the surfaces of skeleton elements of (a), so that a gas flow path(s) surrounded by particles of (c) passes through (a) between both surfaces of (a).

ADVANTAGE - The current collector has high hydrophilic property, making condensation product water and reaction product water move freely in the collector so that reaction gas is not hampered by the water. This maintains reliable gas permeability so cell characteristics such as cell voltage do not decrease and stable power generation is achieved.

ABDT EP872907

A fuel cell comprises: (A) a cell including an **electrolyte member** positioned between an anode layer and a cathode layer; (B) a pair of current collectors, each contacting one of the electrode layers, wherein one collector(s) includes (a) a thin **porous substrate** and (b) a hydrophilic material, wherein (b) is provided either to holes of (a) or to surfaces of skeleton elements of (a), so that hydrophilic areas formed by (b) successively pass through (a) between both surfaces of (a); (C) a first channel member which includes channels which face the anode layer with one of the pair of current collectors in between; and (D) a second channel member which includes channels which face the cathode layer with the other one of the pair of current collectors in between, wherein the hydrophilic areas of the current collector(s) are exposed to channels of (C) and/or (D). Also claimed are: such a fuel cell in which, in (B), (b) is loaded into through openings which are established to pass through (a) between both surfaces of (a); a cell structure element, which is a structural unit of a power generation element of a fuel cell, comprising (A) and (B); a current collector comprising (a) and (b) as above; and a polymer electrolyte fuel cell comprising (A), (C), (D), and (B) in which the current collector(s) comprises (a), (b) and (c) a hydrophobic material, wherein both (b) and (c) are provided to either the holes of (a) or to the surfaces of skeleton elements of (a), so that a gas flow path(s) surrounded by particles of (c) passes through (a) between both surfaces of (a).

ADVANTAGE

The current collector has high hydrophilic property, making condensation product water and reaction product water move freely in the collector so that reaction gas is not hampered by the water. This maintains reliable gas permeability so cell characteristics such as cell voltage do not decrease and stable power generation is achieved.

EXAMPLE

A cathode-side current collector was made by applying (i) a mixture paste of 60 weight% carbon powder and 40 weight% PTFE, (ii) no mixture, to

both surfaces of carbon paper. The paper was then impregnated with 16 weight% FEP and heat treated at (i) 360°C for 2 hours, (ii) 380°C for 1 hour. The current collector was used in a fuel cell structure in which the electrodes were made of a mixture of 67.9 weight% platinum carbon, 2.1 weight% 'Nafion' (RTM: binder resin) and 30 weight% PTFE by conventional sheet forming methods. The polymer electrolyte membrane was made of 'Nafion' (RTM), and the membrane and the electrodes were crimped by the hot press method at 150°C and 70kg/cm<sup>2</sup> over 90 seconds, with the membrane and electrodes contacting each other. An anode-side current collector was made in the same way as (ii). The completed cell was operated at cell temperature 25°C, cathode gas and anode gas humidification temperatures 30°C, and current densities 0.3A/cm<sup>2</sup> for 0-10 min, 0.4A/cm<sup>2</sup> for 10-20 min, and 0.5A/cm<sup>2</sup> for 20-30 min. The cell voltage (approximate) of the cell initially was (i) 590, (ii) 510 V, after 10 minutes was (i) 570, (ii) 220 V, and after 30 minutes was (i) 400 V, (ii) not measurable.

#### PREFERRED CONSTRUCTION

The hydrophilic areas include a path(s) which is surrounded by particles of (b), and the collector(s) includes a gas flow path(s) which is surrounded by particles of a hydrophobic material provided to the holes or to the surfaces of skeleton elements of (a), with the gas flow path(s) passing through (a) between both its surfaces. In the polymer electrolyte fuel cell, when only one of the current collectors includes the hydrophilic areas and gas flow paths, the current collector contacts the cathode layer, wherein reaction product water generated by electrode reaction goes through the hydrophilic areas and is let out to the channels of (D). When both current collectors include the hydrophilic areas and gas flow paths, the current collectors respectively contact the cathode layer and the anode layer, wherein the reaction product water goes through the hydrophilic areas of the collector contacting the cathode layer and is let out to the channels of (D), and anode gas which is humidified before-hand is supplied to the anode layer during operation of the cell, water supplied through the channels of (C) goes through the hydrophilic areas of the collector contacting the anode layer and is used to humidify the polymer electrolyte membrane. The anode layer and the cathode layer are made of a catalyst and a hydrophilic material, with the hydrophilic material binding particles of the catalyst; and a component material of the anode or cathode layers is used as the hydrophilic material (b) loaded into the through openings passing through (a).

#### PREFERRED MATERIALS

(a) is made of carbon fibres, metal fibres or glass fibres. (b) comprises carbon, metal, glass, ceramic, silica gel, zeolite, perfluorocarbon sulphononic acid polymer, perfluorocarbon carboxylic acid polymer, nylon, rayon, polyester, acrylic fibres, polychloral or vinylidene chloride polymer. (c) is a fluoro-resin, preferably polytetrafluoroethylene (PTFE), tetrafluoroethylene (TFE)-perfluoroalkylvinylether copolymer, TFE-hexafluoropropylene copolymer (FEP), polychlorotrifluoroethylene, polyvinylidene fluoride, polyvinyl fluoride or TFE-ethylene copolymer.

FS CPI; EPI

MC CPI: A12-E06; L03-E04

EPI: X16-C; X16-C01; X16-E06

L79 ANSWER 32 OF 67 WPIX COPYRIGHT 2007

THE THOMSON CORP on STN

AN 1997-473528 [44] WPIX Full-text

DNC C1997-150589 [44]

DNN N1997-394821 [44]

TI Composite polymer **electrolyte membrane** for secondary electrochemical cell - consisting of matrix of porous PTFE membrane and surface having coating of ion-**conductive polymer** gel which comprises organic polymer component

DC A12; A14; A85; L03; X16

IN ICHINO T; KATO H; MUSHIAKE N; MUSHIAKI N; TAKESHITA Y; WANI T; YAMAMOTO F

PA (NIGO-C) JAPAN GORE TEX INC; (NITE-C) NIPPON TELEGRAPH & TELEPHONE CORP

CYC 6

PI EP 798791 A2 19971001 (199744)\* EN 7[0]

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JP 09259924 A 19971003 (199750) JA 5[0]

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US 5858264 A 19990112 (199910) EN

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EP 798791 B1 20020130 (200209) EN

JP 3262708 B2 20020304 (200219) JA 5

DE 69710117 E 20020314 (200226) DE

ADT EP 798791 A2 EP 1997-301968 19970326; JP 09259924 A JP 1996-94653 19960326; JP 3262708 B2 JP 1996-94653 19960326; DE 69710117 E DE 1997-69710117 19970326; DE 69710117 E EP 1997-301968 19970326; US 5858264 A US 1997-824864 19970326

FDT DE 69710117 E Based on EP 798791 A; JP 3262708 B2 Previous Publ JP 09259924 A

PRAI JP 1996-94653 19960326

IC ICM H01M002-00

IPCR H01M0010-36 [I,C]; H01M0010-40 [I,A]; H01M0006-18 [I,A]; H01M0006-18 [I,C]

AB EP 798791 A2 UPAB: 20060113

A composite polymer **electrolyte membrane** comprises a matrix material formed of a porous PTFE membrane having opposite-facing planar surfaces and having in between a three-dimensional network of interconnected passages and pathways, one of the surfaces having a coating of an ion-**conductive polymer** gel and an ion-**conductive polymer** gel, whereby a continuous ion-conductive path from the coated surface to the opposed surface is provided. The ion-conductive gel comprises an organic polymer component and an ion-conductive component and the composite membrane has a tensile break strength in  $\geq 2$  orthogonal directions of  $\geq 10$  MPa.

USE - Useful as a separator between electrodes of a Li secondary cell.

ADVANTAGE - The separator combines high strength,  $\geq 10$ MPa in  $\geq 2$  orthogonal directions, and high ion conductivity of  $\geq 1$  mS/cm.

ABDT EP798791

A composite polymer **electrolyte membrane** comprises a matrix material formed of a porous PTFE membrane having opposite-facing planar surfaces and having in between a three-dimensional network of interconnected passages and pathways, one of the surfaces having a coating of an ion-**conductive polymer** gel and an ion-**conductive polymer** gel, whereby a continuous ion-conductive path from the coated surface to the opposed surface is provided. The ion-conductive gel comprises an organic polymer component and an ion-conductive component and the composite membrane has a tensile break strength in  $\geq 2$  orthogonal directions of  $\geq 10$  MPa.

USE

Useful as a separator between electrodes of a Li secondary cell.

ADVANTAGE

The separator combines high strength,  $\geq 10$ MPa in  $\geq 2$

orthogonal directions, and high ion conductivity of  $\geq 1$  mS/cm.

#### EXAMPLE

A solution containing an ion-conductive component was prepared by dissolving 1 mol of LiPF<sub>6</sub> (anhydrous) in a mixture having equal volumes of ethylene carbonate and propylene carbonate (both anhydrous). 10g of a copolymer was added to 100g of the solution and methyl acrylate (molar ratio -80:20) weight average MW - 200,000). A porous membrane of expanded PTFE was immersed in the solution and the vessel was placed under vacuum. After removal the tensile strength was found to be  $\geq 12$  MPa in all planar directions of the composite polymer **electrolyte membrane**. The ion conductivity of the membrane was measured and found to be 1.2 mS/cm. After allowing the polymer **electrolyte membrane** to stand for 1 month, the ion conductivity and tensile strength were measured again. The ion conductivity was  $\geq 1$  mS/cm and there was no change in the tensile breaking strength.

#### PREFERRED MEMBRANE

The matrix material is a porous membrane of expanded PTFE. The organic polymer component includes a polymer derived from a monomer of structural formula  $H_2C=CHCOOR$  and  $H_2C=CHOCOR$ , where R is at H or a 1-6C alkyl. The organic polymer component includes  $\geq 1$  polymer derived from alkylene oxides, (meth)acrylonitrile, vinylidene chloride, vinyl chloride, (meth)acrylic acid, acrylic acid, vinyl alcohol, vinylidene chloride, ethyleneimide, vinyl acetate, vinyl pyrrolidone and cellulose.

The organic polymer component includes a copolymer of acrylonitrile and butadiene and the amount of ion-conductive component is equal to or greater than the weight amount of organic polymer component. The membrane preferably has an ionic conductivity of  $\geq 1$  mS/cm and a tensile break strength in all planar directions of  $\geq 10$  MPa.

FS CPI; EPI

MC CPI: A04-E08; A09-A03; A12-E09; L03-E01A

EPI: X16-B01F1; X16-F02

L79 ANSWER 33 OF 67 WPIX COPYRIGHT 2007

THE THOMSON CORP on STN

AN 1996-476805 [47] WPIX Full-text

DNC C1996-148867 [47]

DNN N1996-402133 [47]

TI New device for topical treatment of skin wounds treatable with oxygen  
- comprises wound dressing patch and oxygen regulating device to  
modulate supply of oxygen

DC B07; D22; P32; P34

IN BURK M I; SCHERSON D A

PA (BURK-I) BURK M I; (SCHE-I) SCHERSON D A

CYC 64

PI WO 9632082 A1 19961017 (199647)\* EN 30[2]

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US 5578022 A 19961126 (199702) EN 7[2]

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AU 9653884 A 19961030 (199708) EN

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EP 820262 A1 19980128 (199809) EN

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US 5855570 A 19990105 (199909) EN

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CN 1217641 A 19990526 (199939) ZH

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KR 98703841 A 19981205 (200006) KO

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AU 716088 B 20000217 (200019) EN  
 JP 2000507459 W 20000620 (200036) JA 18  
 NZ 305771 A 20011026 (200176) EN  
 EP 820262 B1 20040218 (200413) EN  
 DE 69631587 E 20040325 (200423) DE

ADT WO 9632082 A1 WO 1996-US4849 19960410; US 5578022 A US  
 1995-421679 19950412; US 5855570 A Cont of US 1995-421679  
 19950412; AU 9653884 A AU 1996-53884 19960410; AU  
 716088 B AU 1996-53884 19960410; CN 1217641 A CN  
 1996-194364 19960410; DE 69631587 E DE 1996-69631587  
 19960410; EP 820262 A1 EP 1996-910785 19960410; EP  
 820262 B1 EP 1996-910785 19960410; DE 69631587 E EP  
 1996-910785 19960410; JP 2000507459 W JP 1996-531102  
 19960410; NZ 305771 A NZ 1996-305771 19960410; EP  
 820262 A1 WO 1996-US4849 19960410; KR 98703841 A WO  
 1996-US4849 19960410; JP 2000507459 W WO 1996-US4849  
 19960410; NZ 305771 A WO 1996-US4849 19960410; EP  
 820262 B1 WO 1996-US4849 19960410; DE 69631587 E WO  
 1996-US4849 19960410; US 5855570 A US 1996-753421  
 19961125; KR 98703841 A KR 1997-707241 19971013

FDT AU 716088 B Previous Publ AU 9653884 A; DE 69631587 E Based on EP  
 820262 A; US 5855570 A Cont of US 5578022 A; AU 9653884 A Based on WO  
 9632082 A; EP 820262 A1 Based on WO 9632082 A; KR 98703841 A Based on  
 WO 9632082 A; AU 716088 B Based on WO 9632082 A; JP 2000507459 W Based  
 on WO 9632082 A; NZ 305771 A Based on WO 9632082 A; EP 820262 B1 Based  
 on WO 9632082 A; DE 69631587 E Based on WO 9632082 A

PRAI US 1995-421679 19950412  
 US 1996-753421 19961125

IC ICM A61F013-00

IPCR A61F0013-00 [I,A]; A61F0013-00 [I,C]

AB WO 1996032082 A1 UPAB: 20060112

A new device for modulating a supply of oxygen for topical treatment of skin wounds comprises a wound dressing patch adapted for receipt over a skin wound treatable with oxygen and an oxygen regulating device incorporated within the wound dressing patch for modulating a supply of oxygen to the skin wound. The supply of oxygen can be modulated between 0 and 100% oxygen concentration. The device may generate oxygen electrochemically and include: a **cathode** for reducing oxygen in a feed gas to negative ions and/or neutral species; an electrolyte for diffusing the negative ions and/or neutral species through; and an **anode** communicating with the electrolyte for oxidising the negative ions and/or neutral species to produce a high concentration of oxygen for supply to the skin wound.

USE - The device is used for the topical application of oxygen to promote the healing of skin wounds.

ADVANTAGE - Concentrate oxygen may be supplied topically to a skin wound without running the risk of supplying toxic amounts of oxygen to the wound or areas surrounding the wound. Toxic effects from systemic administration are avoided. The bandage or wound dressing itself is portable and generates hyperbaric oxygen from ambient air for supply to a patient without the need for an external supply of pressurised oxygen. The bandage has full occlusion around the wound site. The fully enclosed wound is protected from aerobic infection while anaerobic bacteria are destroyed by the oxygen therapy. Further sterilisation also occurs inside the bandage both chemically (i.e. via traces of electrogenerated peroxide) as well as electrochemically, by electrochemical destruction at the electrodes. ABDT WO9632082

A new device for modulating a supply of oxygen for topical treatment of skin wounds comprises a wound dressing patch adapted for receipt over a skin wound treatable with oxygen and an oxygen regulating device incorporated within the wound dressing patch for modulating a supply of oxygen to the skin wound.  
 Also claimed is



(i) a method for treating skin wounds using an electrochemical cell, comprising bringing ambient air into contact with a gas **permeable cathode**; reducing oxygen present in the air to negatively charged ions or neutral species at the **cathode**; diffusing the ions or neutral species through an electrolyte to a gas **permeable anode**; oxidising the ions or neutral species to oxygen at the **anode**; and modulating a supply of oxygen to a skin wound.

(ii) a method for treating skin wounds comprising placing an oxygen generating wound dressing patch over a skin wound, a power source supplying energy to the patch; bringing air into contact with a **cathode** incorporated in the patch; reducing oxygen present in the air to negative ions or neutral species at the **cathode**; diffusing the ions and/or neutral species through an electrolyte to an **anode** (the electrolyte and **anode** are incorporated in the wound dressing patch); converting the ions and/or neutral species to dioxygen at the **anode**; and passing the dioxygen out the **anode** to the skin wound.

#### USE

The device is used for the topical application of oxygen to promote the healing of skin wounds.

#### ADVANTAGE

Concentrate oxygen may be supplied topically to a skin wound without running the risk of supplying toxic amts. of oxygen to the wound or areas surrounding the wound. Toxic effects from systemic admin. are avoided. The bandage or wound dressing itself is portable and generates hyperbaric oxygen from ambient air for supply to a patient without the need for an external supply of pressurised oxygen.

The bandage has full occlusion around the wound site. The fully enclosed wound is protected from aerobic infection while anaerobic bacteria are destroyed by the oxygen therapy. Further sterilisation also occurs inside the bandage both chemically (i.e. via traces of electrogenerated peroxide) as well as electrochemically, by electrochemical destruction at the electrodes.

#### EXAMPLE

Figure 1 schematically diagrams a side view of the device or patch. Dioxygen is produced electrochemically by a three-layer sandwich-type structure comprising a gas-**permeable cathode** (10), a separator membrane (14) embedded with an immobilised electrolyte, and a gas-**permeable anode** (18). The **cathode** is exposed to the atmos. and the **anode** is intended for exposure to a skin wound. The electrolyte may be either alkaline or acidic, such as a **proton conducting solid polymer** electrolyte film, and either moist or doped with an acid solution. Dioxygen supplied from the atmospheric air at (22) is reduced at the gas **permeable cathode** (10) to negatively charged ions, i.e. superoxide and peroxide and their various unprotonated and **protonated** states ( $\text{HO}_2$ ,  $\text{HO}_2^-$ ,  $\text{O}_2^{2-}$ ) or hydroxyl ions or undissociated  $\text{H}_2\text{O}_2$  according to a one, two or four electron process.

The **cathode** is of the type used in **fuel cells**. One or more of these species then travel through the thin separator/**electrolyte** structure or **membrane** (14) to the gas **permeable anode** (18) where they are reconverted to dioxygen. The dioxygen flows out of the **anode** at (24) and is intended to be directed to a skin wound. The patch shown in Figure 1 is powered by an air driven battery, in this case a zinc/air battery, with components similar to those used in conventional hearing aid batteries, and built directly onto the three layer structure. It takes advantage of a bipolar-type design to

simplify manufacturing. A small amount of zinc powder is mixed with a gelled alkaline electrolyte and placed on top of the gas fed **cathode** as a zinc electrode (28). It is then fully covered with a separator or membrane (32). To complete the battery, the gas fed **anode** (18) is folded around the structure and placed directly on top of the separator to become the battery **cathode** (36). The single gas **permeable** electrode playing a dual role, being both the **anode** (18) for the generation of oxygen at (24), and the **cathode** (36) or air electrode in the zinc/air battery design.

During operation, air flows to the zinc/air battery such as exemplified at (38). Electrical insulators (40) are positioned around the **cathode** (10), membrane (14), membrane (32) and **cathode** (36) to properly isolate both electronically and ionically each of the active components of the bandage and battery. Adhesive is depicted at (44) for affixing the patch over a skin wound such that oxygen cannot flow readily out of the treatment area. The patch will have some one way valves or small capillary **holes** to permit outflow of air. The bandage is occlusive on all sides and offers anti-bacterial control without antibiotics or antiseptics, although these can still be used for added protection. (AB)

#### PREFERRED COMPOSITION

The supply of oxygen can be modulated between 0 and 100% oxygen concentration. The device may generate oxygen electrochemically and includes: a **cathode** for reducing oxygen in a feed gas to negative ions and/or neutral species; an electrolyte for diffusing the ions and/or neutral species through; and an **anode** communicating with the electrolyte for oxidising the ions and/or neutral species to produce a high concentration of oxygen for supply to the skin wound. The production of oxygen occurs according to a one, two or four electron process. The negative ions are peroxide ions in their various unprotonated and **protonated** forms, superoxide ions including their **protonated** form or hydroxyl ions; the overall process involves electrolysis of water. The device may generate oxygen according to an electrochemical process and include a power source which applies a potential difference between a **cathode** and **anode** to generate concentrate oxygen from ambient air.

The power source is selected from capacitors, supercapacitors, photovoltaic cells, batteries and alternating current power. Polarity on the power source is reversible to modulate the oxygen concentration. The power source is incorporated into the patch and is a bipolar battery or the power source is external to the patch. A zinc/air battery incorporated into the device supplies power to conduct the concentration of oxygen from air according to a one, two or four electron process. The device may generate oxygen according to a thermally or chemically induced reaction. The device modulates a supply of oxygen to the skin wound at various pressures ranging from below atmospheric pressure to above atmospheric pressure. The pressures range from about 0.5 to 5 atmos., pref. about 0.75 to 2.5 atmos., partic. pref. about 0.95 to 1.1 atmos.

The device consists of a first layer comprising a battery, a second layer comprising a medicinal, a third layer comprising a sensor and a fourth layer comprising an oxygen concentrator. The sensor includes control circuitry to promote optimal healing.

The method for treating skin wounds using an electrochemical cell comprises the additional steps of fully occluding a bandage incorporating the **cathode**, electrolyte and **anode** to skin surrounding a skin wound, killing anaerobic bacteria, inhibiting toxic formation by anaerobic bacteria, controlling or preventing aerobic bacterial infection through concentrate oxygen and

supplying oxygen to the skin wound at pressures of about 0.5 to 5 atmos. The method comprises the additional step of controlling a rate of wound healing by increasing or decreasing the oxygen tension in tissues that stimulate healing.

FS CPI; GMPI

MC CPI: B05-C08; B11-C04; B12-M02D; B14-N17B; D09-A01A

L79 ANSWER 34 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 1995-187495 [25] WPIX Full-text

CR 2001-391606

DNC C1995-087056 [25]

DNN N1995-146860 [25]

TI Gas-liquid-**permeable** electrode and process useful in solid polymer **fuel cells** - comprises non-uniform electrode layer giving increased electrochemical performance

DC A85; E36; J03; J04; L03; X16

IN FROST J C; GASCOYNE J M; HARDS G A; PRATER K B; WILKINSON D P

PA (JOHO-C) JOHNSON MATTHEY PLC

CYC 5

PI EP 654837 A1 19950524 (199525)\* EN 14[3]

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CA 2136133 A 19950524 (199534) EN

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JP 07240204 A 19950912 (199545) JA 10

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US 5702839 A 19971230 (199807) EN 12[3]

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US 5871860 A 19990216 (199914) EN

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EP 654837 B1 20010711 (200140) EN

DE 69427676 E 20010816 (200154) DE

CA 2136133 C 20050823 (200557) EN

ADT EP 654837 A1 EP 1994-308416 19941115; DE 69427676 E DE

1994-69427676 19941115; EP 654837 B1 EP 1994-308416

19941115; DE 69427676 E EP 1994-308416 19941115; US

5702839 A Cont of US 1994-340418 19941115; US 5871860 A Cont

of US 1994-340418 19941115; CA 2136133 A CA

1994-2136133 19941118; CA 2136133 C CA 1994-2136133

19941118; JP 07240204 A JP 1994-289937 19941124; US

5702839 A US 1996-666056 19960619; US 5871860 A Cont of

US 1996-666056 19960619; US 5871860 A US 1997-895987

19970717; EP 654837 B1 Related to EP 2000-126824 19941115

FDT EP 654837 B1 Related to EP 1096586 A; DE 69427676 E Based on EP 654837

A; US 5871860 A Cont of US 5702839 A

PRAI GB 1993-24101 19931123

IC ICM H01M004-86

IPCR H01M0004-86 [I,A]; H01M0004-86 [I,C]; H01M0004-88 [I,A]; H01M0004-88

[I,C]; H01M0004-90 [I,A]; H01M0004-90 [I,C]; H01M0004-92 [I,A];

H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-10 [I,A]; H01M0008-10

[I,C]

AB EP 654837 A1 UPAB: 20060109

A gas-liquid **permeable porous** electrode comprises a non-uniform electrode layer supported on at least one side of a substrate and comprising a region near a bulk gas inlet having a different amount of a component per unit area than a region remote from this area. When the component is an electrocatalyst the amount of component is not increased between a gas inlet and outlet. Also claimed is a membrane electrode assembly where at least one of the electrodes is as above.

Further claimed is a **fuel cell** comprising the electrode above.

Also claimed is a process for the production of an electrode as above comprising preparation of components and solvent into paste which is transferred on to the substrate to form the non-uniform electrode above.

USE - For solid polymer **fuel cells**, metal-air batteries, ozone-generating cathodes, and gas sensors.

ADVANTAGE - Electrochemical performance is improved (Fig.) using the same total electrocatalyst loading. ABDT EP654837

A gas-liquid **permeable porous** electrode comprises a non-uniform electrode layer supported on at least one side of a substrate and comprising a region near a bulk gas inlet having a different amount of a component per unit area than a region remote from this area. When the component is an electrocatalyst the amount of component is not increased between a gas inlet and outlet.

Also claimed is a membrane electrode assembly where at least one of the electrodes is as above.

Further claimed is a **fuel cell** comprising the electrode above.

Also claimed is a process for the production of an electrode as above comprising preparation of components and solvent into paste which is transferred on to the substrate to form the non-uniform electrode above.

USE

For solid polymer **fuel cells**, metal-air batteries, ozone-generating cathodes, and gas sensors.

ADVANTAGE

Electrochemical performance is improved (Fig.) using the same total electrocatalyst loading.

PREFERRED ELECTRODE/PROCESS

The non-uniform layer comprises one or more of a polymer, a gas-phase active catalyst, carbon fibres/particles, or a contact resistance adhesive; the polymer is polyethylene, PTFE, PVC, and/or a soluble form of a **proton-conducting polymer membrane electrolyte**.

The layer is an electrocatalyst and is a metal, selected from the Pt gp., Au, Ag or alloys, a metal oxide, a supported metal or oxide, an in amount of 0.01-10 mg cm<sup>-2</sup>.

The amount of catalyst decreases between gas inlet and outlet, the electrode layer is patterned, and forms an **anode** or **cathode** of a **fuel cell**.

The layer is formed by screen printing.

FS CPI; EPI

MC CPI: A12-E06; E31-D04; J03-B01; L03-E04B

EPI: X16-C01; X16-E06A

L79 ANSWER 35 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 1994-182603 [22] WPIX Full-text

CR 1993-295215

DNC C1994-082769 [22]

DNN N1994-144242 [22]

TI Solid polymer electrolyte **fuel cell** - using **porous** gas diffusion electrodes and an electrolyte comprising per-fluorocarbon **copolymer proton conducting** material

DC A85; L03; X16

IN DHAR H P

PA (BCST-N) BCS TECHNOLOGY INC

CYC 1

PI US 5318863 A 19940607 (199422)\* EN 19[10]

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ADT US 5318863 A CIP of US 1991-809581 19911217; US 5318863 A

US 1993-23589 19930226

FDT US 5318863 A CIP of US 5242764 A

PRAI US 1993-23589 19930226

US 1991-809581 19911217

IPCR H01M0008-04 [N,A]; H01M0008-04 [N,C]; H01M0008-10 [I,A]; H01M0008-10 [I,C]

AB US 5318863 A UPAB: 20060109

A **fuel cell** comprises: a first electrode having a surface; a second electrode having a surface opposing the first electrode surface; an electrolyte member located between and in contact with the opposing surfaces of the two electrodes; a non-conducting film having a central **hole**, and positioned between the two electrodes and contacting the outer periphery of the opposing surfaces of the two electrodes, and wherein the central **hole** surrounds and contacts the electrolyte member; a fuel distribution member for supplying fuel to the first electrode; an oxidant distribution member for supplying oxidant to the second electrode.

Two further configurations of the above cell are also claimed. The non-conducting film, e.g. polypropylene, is bonded to the two electrodes and the catalyst layers; the electrolyte deposits each comprise a perfluorocarbon **copolymer proton conducting** material or a mixture of at least two perfluorocarbon **copolymer proton conducting** materials; each electrolyte deposit in the dry state is between 10 to 20 mg per 5 cm<sup>2</sup> electrode area of a 5% concentrate solution of the conducting material; the catalyst layers are Pt; the **electrolyte membrane** has an equivalent weight 1000g or less, and a thickness 125 micron or less, or, if thinner, has a higher equivalent weight

USE/ADVANTAGE - Solid polymer electrolyte or **proton** exchange membrane **fuel cell**, operable at near ambient temperature and press. without external humidification. Operates at near ambient temperature and press. with no requirement for humidification, thus allowing for less complicated and lighter modules. - In an example, a **fuel cell** assembly (5) includes gaseous reactants which include a fuel source (10) and an oxidiser source (12). The gases (10,12) diffuse through **anode** backing layer (14) and **cathode** backing layer (16), resp., to **porous** electrodes forming an oxidising electrode or **anode** (18) and a reducing electrode or **cathode** (20). The electrodes have deposits of solid electrolyte (22,24) together with an oversized membrane (30) positioned therebetween with a **hole** (32), separate the **anode** (18) and the **cathode** (20). **Anode** connection (42) and **cathode** connection (44) are used to interconnect with an external circuit or with other **fuel cell** assemblies. A membrane/electrodes assembly is prepared by putting the components together and pressing for about 90 secs. at a press. of 1000 psig and at a temperature 130 deg.C.

FS CPI; EPI

MC CPI: A04-E10; A12-E06; A12-M01; A12-M02; L03-E04B

EPI: X16-C01; X16-J01A

L79 ANSWER 36 OF 67 WPIX COPYRIGHT 2007 THE THOMSON CORP on STN

AN 1991-216612 [30] WPIX Full-text

DNC C1991-094018 [21]

DNN N1991-165288 [21]

TI Solid capacitor having electrical characteristics - comprising porous electrode, dielectric layer and electrically conductive layer

DC A85; L03; V01

IN HASHIZUME K; ISA I; ISHIKAWA I; KINUTA K; KINUTA Y; KUME N; YAMAMOTO H

PA (JCAR-C) JAPAN CARLIT CO LTD; (MATU-C) MATSUSHITA ELEC IND CO LTD

CYC 5

PI EP 437857 A 19910724 (199130)\* EN

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JP 03203211 A 19910904 (199142) JA

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JP 04087312 A 19920319 (199218) JA 6

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US 5119274      A  19920602 (199225)  EN   8
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EP 437857      A3 19920805 (199336)  EN
<--
JP 07007740    B2 19950130 (199509)  JA   5
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JP 07022068    B2 19950308 (199514)  JA
<--
EP 437857      B1 19950712 (199532)  EN  12[0]
<--
DE 69020880    E  19950817 (199538)  DE
<--
ADT EP 437857 A EP 1990-125769 19901228; JP 03203211 A JP
1989-340733 19891229; JP 07007740 B2 JP 1989-340733
19891229; JP 03203211 A JP 1990-202182 19900730; JP
04087312 A JP 1990-202182 19900730; JP 07022068 B2 JP
1990-202182 19900730; US 5119274 A US 1990-633884
19901226; DE 69020880 E DE 1990-69020880 19901228; EP
437857 A3 EP 1990-125769 19901228; EP 437857 B1 EP
1990-125769 19901228; DE 69020880 E EP 1990-125769
19901228
FDT DE 69020880 E Based on EP 437857 A; JP 07007740 B2 Based on JP
03203211 A; JP 07022068 B2 Based on JP 04087312 A
PRAI JP 1990-202182 19900730
      JP 1989-340733 19891229
IC   ICM H01G004-18
IPCR C08G0061-00 [I,C]; C08G0061-00 [I,C]; C08G0061-10 [I,A]; C08G0061-12
[I,A]; C08G0061-12 [I,A]; C09D0179-00 [I,C]; C09D0179-08 [I,A];
C09D0005-24 [I,A]; C09D0005-24 [I,C]; H01G0004-008 [I,A]; H01G0004-008
[I,C]; H01G0004-06 [I,A]; H01G0004-06 [I,C]; H01G0004-14 [I,C];
H01G0004-14 [I,C]; H01G0004-18 [I,A]; H01G0004-18 [I,A]; H01G0004-33
[I,A]; H01G0004-33 [I,C]
AB   EP 437857 A   UPAB: 20060106
Solid capacitor comprises an electrode formed from a conductor having a porous
surface, a dielectric layer formed from an insulating polymer thin film on the
porous surface of the conductor, and a counter electrode formed from an
electrically conductive layer on the surface of the dielectric layer.
Pref. the insulating polymer thin film is a polyimide thin film formed by use
of a soln containing a salt of polyamic acid as an electrocoating solution to
form a thin film of the salt on the porous surface of the conductor, after
which the thin film of the salt of polyamic acid is dehydrated to polyimide.
Pref. the electrically conductive layer consists of an electrically conductive
polymer layer prepd by chemical oxidation polymerisation and an electrically
conductive polymer layer prepared by electrolytic polymerisation. Electrically
conductive layer is of polypyrrole.
      ADVANTAGE - Capacitor has excellent electric characteristics such as
high capacitance, low dielectric losses and the ability to withstand high
voltage.
FS   CPI; EPI
MC   CPI: A12-E07B; L03-B05F
      EPI: V01-B03B; V01-B03D

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=> d 37-67 ibib abs ind

L79 ANSWER 37 OF 67 COMPENDEX COPYRIGHT 2007 EEI on STN DUPLICATE 3  
 ACCESSION NUMBER: 1999(22):1457 COMPENDEX Full-text  
 TITLE: Methanol fuel cell model: Anode.  
 AUTHOR: Baxter, S.F. (Argonne Natl Lab, Argonne, IL, USA);

Battaglia, V.S.; White, R.E.  
 SOURCE: Journal of the Electrochemical Society v 146 n 2  
 Feb 1999.p 437-447  
 SOURCE: Journal of the Electrochemical Society v 146 n 2  
 Feb 1999.p 437-447  
 CODEN: JESOAN ISSN: 0013-4651  
 PUBLICATION YEAR: 1999  
 DOCUMENT TYPE: Journal  
 TREATMENT CODE: Experimental  
 LANGUAGE: English  
 AN 1999(22):1457 COMPENDEX Full-text  
 AB An isothermal, steady-state model of an anode in a direct methanol feed, polymer electrolyte fuel cell is presented. The anode is considered to be a **porous** electrode consisting of an electronically conducting catalyst structure that is thinly coated with an ion-selective polymer electrolyte. The **pores** are filled with a feed solution of 2 M methanol in water. Four species are transported in the anode: water, methanol, hydrogen ions, and carbon dioxide. All four species are allowed to transport in the x-direction through the depth of the electrode. Species movement in the pseudo y-direction is taken into account for water, methanol, and carbon dioxide by use of an effective mass-transfer coefficient. Butler-Volmer kinetics are observed for the methanol oxidation reaction. Predictions of the model have been fitted with kinetic parameters from experimental data, and a sensitivity analysis was performed to identify critical parameters affecting the anode's performance. Kinetic limitations are a dominant factor in the performance of the system. At higher currents, the **polymer** electrolyte's **conductivity** and the anode's thickness were also found to be important parameters to the prediction of a polymer **electrolyte membrane** fuel cell anode's behavior in the methanol oxidation region 0.5-0.6 V vs. a reversible hydrogen electrode. (Author abstract) 20 Refs.  
 AN 1999(22):1457 COMPENDEX Full-text  
 CC 714.1 Electron Tubes; 801.4.1 Electrochemistry; 802.1 Chemical Plants and Equipment; 704.1 Electric Components; 815.1.1 Organic Polymers; 817.1 Plastics Products  
 CT \*Anodes; Carbon dioxide; Fuel cells; **Porous** materials; Methanol; Catalysts; Water; Hydrogen; Electrochemical electrodes; Polyelectrolytes  
 ST Mass transfer coefficient; Butler-Volmer kinetics  
 L79 ANSWER 38 OF 67 COMPENDEX COPYRIGHT 2007 EEI on STN DUPLICATE 4  
 ACCESSION NUMBER: 1989(6):52980 COMPENDEX Full-text  
 DOCUMENT NUMBER: 890651166  
 TITLE: Kinetics of fuel cell reactions at the platinum/solid polymer electrolyte interface.  
 AUTHOR: Paik, Woon-kie (Los Alamos Natl Lab, Los Alamos, NM, USA); Springer, Thomas E.; Srinivasan, Supramaniam  
 SOURCE: J Electrochem Soc v 136 n 3 Mar 1989 p 644-649  
 SOURCE: J Electrochem Soc v 136 n 3 Mar 1989 p 644-649  
 CODEN: JESOAN ISSN: 0013-4651  
 PUBLICATION YEAR: 1989  
 DOCUMENT TYPE: Journal  
 TREATMENT CODE: Experimental  
 LANGUAGE: English  
 AN 1989(6):52980 COMPENDEX DN 890651166 Full-text  
 AB Platinum gauze electrodes coated with the **proton-conducting polymer**, Nafion, were investigated with respect to the kinetics of the oxygen reduction and hydrogen oxidation reactions. The coated electrodes were in contact with a Nafion **membrane electrolyte**. The current-potential behavior of the coated electrodes depended upon the thickness of the coating. The electrodes with

thicker coatings exhibited less activation and ohmic control but encountered diffusion limitations. Those with thinner coatings showed significant ohmic control. A theoretical analysis was made for the current-potential relation and the current distribution using a model of a Nafion-coated wire in contact with the membrane. The present analysis confirms the necessity of optimizing the amount of Nafion impregnation in low-Pt-loaded, **porous** gas-diffusion electrodes, as was experimentally observed in another study in our laboratory. (Author abstract) 26 Refs.

AN 1989(6):52980 COMPENDEX DN 890651166 Full-text  
 CC 702 Electric Batteries & Fuel Cells; 801 Chemical Analysis & Physical Chemistry; 802 Chemical Apparatus & Plants; 815 Plastics & Polymeric Materials; 804 Chemical Products; 817 Plastics, Products & Applications  
 CT \*FUEL CELLS; COATINGS:Plastics; ELECTRODES:Coatings; OXYGEN:Reduction; ELECTRODES, ELECTROCHEMICAL:Platinum; ELECTROLYTES, SOLID  
 ST SOLID POLYMER ELECTROLYTES; CURRENT DISTRIBUTION; PLATINUM GAUZE ELECTRODES; NAFION PROTON **CONDUCTING POLYMER**  
 ET Pt

L79 ANSWER 39 OF 67 COMPENDEX COPYRIGHT 2007 EEI on STN  
 ACCESSION NUMBER: 1990(9):107822 COMPENDEX Full-text  
 DOCUMENT NUMBER: 9009104544  
 TITLE: Renaissance of the solid polymer fuel cell.  
 AUTHOR: Prater, Keith (Ballard Power Systems, Inc, North Vancouver, BC, Can)  
 MEETING TITLE: Proceedings of the Grove Anniversary Fuel Cell Symposium.  
 MEETING ORGANIZER: British Gas, Engl; British Petroleum, Engl; Cookson Group, Engl; GEC Alsthom, Engl; Imperial Chemical Industries, Engl; et al  
 MEETING LOCATION: London, Engl  
 MEETING DATE: 18 Sep 1989-21 Sep 1989  
 SOURCE: Journal of Power Sources v 29 n 1-2 Jan 1990.p 239-250  
 SOURCE: Journal of Power Sources v 29 n 1-2 Jan 1990.p 239-250  
 CODEN: JPSODZ ISSN: 0378-7753  
 PUBLICATION YEAR: 1990  
 MEETING NUMBER: 13114  
 DOCUMENT TYPE: Journal  
 TREATMENT CODE: Application; General Review  
 LANGUAGE: English

AN 1990(9):107822 COMPENDEX DN 9009104544 Full-text  
 AB The solid polymer fuel cell (SPFC) was first developed by General Electric (GE) for NASA in the 1960s. It consists of two **porous** electrodes, which are lightly catalyzed on one surface, bonded on either side of a thin sheet of a hydrogen ion-**conducting polymer**, the solid polymer electrolyte. Substantial improvements were made since that time so that it seems now that the solid polymer fuel cell is ready for commercialization. 6 Refs.  
 AN 1990(9):107822 COMPENDEX DN 9009104544 Full-text  
 CC 702 Electric Batteries & Fuel Cells; 801 Chemical Analysis & Physical Chemistry  
 CT \*FUEL CELLS:Electrodes; DIRECT ENERGY CONVERSION; ELECTRODES:Materials  
 ST **POROUS ELECTRODES; SOLID POLYMER FUEL CELLS; MEMBRANE ELECTROLYTE**

L79 ANSWER 40 OF 67 COMPENDEX COPYRIGHT 2007 EEI on STN  
 ACCESSION NUMBER: 1988(2):21527 COMPENDEX Full-text  
 DOCUMENT NUMBER: 880215322  
 TITLE: ELECTROCHEMICAL AND ELECTROKINETIC



## CHARACTERIZATION OF CELLULOSE ACETATE POLYMERIC MEMBRANES.

AUTHOR: Thomas, K.C. (BARC, Bombay, India); Ramachandhran, V.; Misra, B.M.

SOURCE: J Appl Polym Sci v 34 n 7 Nov 20 1987 p 2527-2536

SOURCE: J Appl Polym Sci v 34 n 7 Nov 20 1987 p 2527-2536

CODEN: JAPNAB ISSN: 0021-8995

PUBLICATION YEAR: 1987

DOCUMENT TYPE: Journal

TREATMENT CODE: Experimental

LANGUAGE: English

AN 1988(2):21527 COMPENDEX DN 880215322 Full-text

AB The electrochemical and electrokinetic aspects of cellulose acetate membranes of varying **pore** structure and desalting abilities have been investigated. The electrochemical studies included measurement of conductance and membrane potential for various **membrane electrolyte** systems. The electrokinetic characterization was made from streaming potential measurements. The data obtained are explained in terms of interfacial double layer phenomena prevalent in **porous** permselective barrier systems. The average **pore** diameter evaluated independently is also presented and an attempt has been made to understand the solute-water transport in terms of weak ionic character of membrane surface. (Author abstract) 27 refs.

AN 1988(2):21527 COMPENDEX DN 880215322 Full-text

CC 631 Fluid Flow & Hydrodynamics; 804 Chemical Products; 931 Applied Physics; 801 Chemical Analysis & Physical Chemistry; 701 Electricity & Magnetism; 802 Chemical Apparatus & Plants

CT \*MEMBRANES:Performance; **POLYMERS:Electric Conductivity**; CELLULOSE DERIVATIVES

ST CELLULOSE ACETATE; DOUBLE LAYER; **PORE** SIZE; SOLUTE-WATER TRANSPORT

L79 ANSWER 41 OF 67 PASCAL COPYRIGHT 2007 INIST-CNRS. ALL RIGHTS RESERVED. on STN

ACCESSION NUMBER: 1999-0392510 PASCAL Full-text

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TITLE (IN ENGLISH): Doping-dependent ion selectivity of polyaniline membranes

AUTHOR: LEI WEN; KOCHERGINSKY N. M.

CORPORATE SOURCE: Department of Chemical and Environmental Engineering, National University of Singapore, 10 Kent Ridge Crescent, Singapore 119260, Singapore

SOURCE: Synthetic metals, (1999), 106(1), 19-27, 35 refs.

ISSN: 0379-6779 CODEN: SYMEDZ

DOCUMENT TYPE: Journal

BIBLIOGRAPHIC LEVEL: Analytic

COUNTRY: Switzerland

LANGUAGE: English

AVAILABILITY: INIST-18315, 354000086161390030

AN 1999-0392510 PASCAL Full-text

CP Copyright .COPYRGT. 1999 INIST-CNRS. All rights reserved.

AB Polyaniline (PAN) films were cast from a solution in N-methyl-2-pyrrolidone (NMP) and characterised by atomic force microscopy (AFM), FTIR, X-ray, TGA and DSC. Ion selectivity of the films as free-standing **membranes** in the **electrolyte /membrane/electrolyte** system was characterised by transmembrane electric potential. It was demonstrated that PAN membrane has completely different permeability and ion selectivity in the undoped and HCl-doped states. In the undoped state, the membrane is hardly **permeable** to inorganic ions, but still it is selective to H<sup>+</sup>. After HCl-doping transmembrane

resistance decreases by a few orders, of value, and the membrane becomes anion/H.sup.+selective.

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 CC 001D10A06J; Applied sciences; Polymer technology, Materials science  
 CCFR 001D10A06J; Sciences appliquees; Technologie des polymeres, Science des materiaux  
 CCES 001D10A06J; Ciencias aplicadas; Tecnologia de los polimeros, Ciencia de los materiales  
 CT Membrane; Aniline polymer; Doped polymer; Hydrochloric acid; **Conducting polymers**; Thermal stability; Ion transport; Selective permeability; Ionic selectivity; Electrical properties; Experimental study  
 CTFR Membrane; Aniline polymere; Polymere dope; Chlorhydrique acide; **Polymere conducteur**; Stabilite thermique; Transport ion; Permeabilite selective; Selectivite ionique; Propriete electrique; Etude experimentale; Potentiel transmembranaire  
 CTES Membrana; Anilina polimero; Polimero dopado; Acido chlorhidrico; Estabilidad termica; Transporte ionica; Permeabilidad selectiva; Selectividad ionica; Propiedad electrica; Estudio experimental  
 BT Transport properties  
 BTFR Propriete transport  
 BTES Propiedad transporte

L79 ANSWER 42 OF 67 PASCAL COPYRIGHT 2007 INIST-CNRS. ALL RIGHTS RESERVED. on STN

ACCESSION NUMBER: 1998-0394486 PASCAL Full-text  
 COPYRIGHT NOTICE: Copyright .COPYRGT. 1998 INIST-CNRS. All rights reserved.  
 TITLE (IN ENGLISH): Phenomenological theory of electro-osmotic effect and water management in **polymer electrolyte proton-conducting membranes**  
 AUTHOR: EIKERLING M.; KHARKATS Yu. I.; KORNYSHEV A. A.; VOLFKOVICH Y. M.  
 CORPORATE SOURCE: Institut fuer Werkstoffe und Verfahren der Energietechnik, Forschungszentrum Juelich GmbH, 52425 Juelich, Germany, Federal Republic of; The A. N. Frumkin Institute of Electrochemistry, Russian Academy of Sciences, 117071 Moscow, Russian Federation  
 SOURCE: Journal of the Electrochemical Society, (1998), 145(8), 2684-2699, 49 refs.  
 ISSN: 0013-4651 CODEN: JESOAN  
 DOCUMENT TYPE: Journal  
 BIBLIOGRAPHIC LEVEL: Analytic  
 COUNTRY: United States  
 LANGUAGE: English  
 AVAILABILITY: INIST-4925, 354000077196780120

AN 1998-0394486 PASCAL Full-text  
 CP Copyright .COPYRGT. 1998 INIST-CNRS. All rights reserved.  
 AB Partial dehydration of the **proton**-conducting membrane under working conditions is one of the major problems in low-temperature fuel cell technology. In this paper a model, which accounts for the electro-osmotically induced drag of water from anode to cathode and the counterflow in a hydraulic pressure gradient is proposed. A balance of these flows determines a gradient of water content across the membrane, which causes a decline of the current-voltage performance. Phenomenological transport equations coupled with the capillary pressure isotherm are used, involving the conductivity, permeability, and electro-osmotic drag coefficients dependent on the local water content. The effects of membrane parameters on current-voltage

performance are investigated. A universal feature of the obtained current-voltage plots is the existence of a critical current at which the potential drop across the membrane increases dramatically due to the dehydration of membrane layers close to the anode. For a membrane with zero residual conductivity in its dry parts, the critical current is a limiting current. Well below the critical current the effect of dehydration is negligible and the current-voltage plot obeys Ohm's law. The shape of the capillary pressure isotherm determines the nonohmic corrections. A comparison of the results of this study to those of the pertinent diffusion-type models reveals qualitatively different features, the convection model is found to be closer to experimental observations.

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 CC 001C01H08; Chemistry; General chemistry, Physical chemistry; Electrochemistry  
 001D06D03E; Applied sciences; Energy; Thermal use of fuels  
 230; Energy  
 CCFR 001C01H08; Chimie; Chimie generale, Chimie physique; Electrochimie  
 001D06D03E; Sciences appliquees; Energie; Utilisation thermique des combustibles  
 230; Energie  
 CCES 001C01H08; Quimica; Quimica general, Fisicoquimica; Electroquimica  
 001D06D03E; Ciencias aplicadas; Energia; Utilizacion termica de los combustibles  
 230; Energia  
 CT Theoretical study; Modeling; Phenomenological theory; Electroosmosis; Cation exchange membrane; Polymer solid electrolyte; **Porous** material; Water; Water content; Permeability; **Proton** conductivity; Electrical properties; Transport equation; Fuel cell  
 CTFR Etude theorique; Modelisation; Theorie phenomenologique; Electroosmose; Membrane echangeuse cation; Electrolyte solide polymere; Materiau poreux; Eau; Teneur eau; Permeabilite; Conductivite **protonique**; Propriete electrique; Equation transport; Pile combustible  
 CTES Estudio teorico; Modelizacion; Teoria fenomenologica; Electro-osmosis; Membrana cambiadora cationica; Electrolito solido polimero; Material **poroso**; Agua; Dosis agua; Permeabilidad; Conductividad **protonica**; Propiedad electrica; Ecuacion transporte; Pila combustion

L79 ANSWER 43 OF 67 PASCAL COPYRIGHT 2007 INIST-CNRS. ALL RIGHTS RESERVED. on STN

ACCESSION NUMBER: 1998-0330615 PASCAL Full-text  
 COPYRIGHT NOTICE: Copyright .COPYRGT. 1998 INIST-CNRS. All rights reserved.  
 TITLE (IN ENGLISH): Study of the poly(pyrrole) layers on microporous poly(ethylene) film substrate  
 AUTHOR: ROZOVA E. Yu.; POLOTSKAYA G. A.; KOZLOV A. G.; EL'YASHEVICH G. K.; BLEHA M.; KUDELA V.  
 CORPORATE SOURCE: Institute of Macromolecular Compounds, Russian Academy of Sciences, Bol'shoi Pr. 31, St. Petersburg, 199004, Russian Federation; Institute of Macromolecular Chemistry, Czech Republic Academy of Sciences, Heyrovsky nam. 2, Prague, 16206, Czech Republic  
 SOURCE: Polymer science. Series A, (1998), 40(6), 530-535, 19 refs.  
 DOCUMENT TYPE: Journal; Translation  
 BIBLIOGRAPHIC LEVEL: Analytic  
 COUNTRY: United States  
 LANGUAGE: English

NOTE: Trad. de: Wysokomolekularnye Soedineniya, RU,  
1998, 6, 914-920

AVAILABILITY: INIST-3132A, 354000072188530030

AN 1998-0330615 PASCAL Full-text

CP Copyright .COPYRGT. 1998 INIST-CNRS. All rights reserved.

AB The synthesis of poly(pyrrole) (PPyr) layers by the in situ oxidative polymerization of pyrrole from the gas phase on the **surface** of a **porous** PE film **substrate** and the properties of PE-PPyr systems with various PPyr contents were studied by the methods of ultrafiltration, gas separation, and electrodialysis. Study of the process kinetics revealed three stages of the PPyr polymerization in situ on the PE film substrate. It was established that the PE-PPyr systems containing less than 12% PPyr can be considered to be ultrafiltration membranes **permeable** for liquids. HCl-doped PE-PPyr composite systems have anion-exchange **membrane** properties. The **electrolytic** resistance of these membranes in the dc and ac regimes was studied as a function of the PPyr content. The structures of the initial PE films and PE-PPyr composite membranes were studied by scanning electron microscopy. Mechanical properties of the PE-PPyr samples with various PPyr contents were determined and compared to those of the PE substrates.

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CC 001D10A06J; Applied sciences; Polymer technology, Materials science

CCFR 001D10A06J; Sciences appliquees; Technologie des polymeres, Science des matériaux

CCES 001D10A06J; Ciencias aplicadas; Tecnologia de los polimeros, Ciencia de los materiales

CT Anion exchange membrane; Polyethylene; Pyrrole polymer;  
**Conducting polymers**; Manufacturing process;  
Oxidative polymerization; Heterogeneous polymerization; Gas solid reaction; In situ; Morphology; Gas permeability; Ultrafiltration; Protein; Ion transport; Transport number; Electrical properties; Mechanical properties; Property composition relationship; Experimental study

CTFR Membrane échangeuse anion; Ethylene polymere; Pyrrole polymere;  
**Polymere conducteur**; Procédé fabrication;  
Polymerisation oxydante; Polymerisation phase heterogene; Reaction gaz solide; In situ; Morphologie; Permeabilite gaz; Ultrafiltration; Proteine; Transport ion; Nombre transport; Propriete electrique; Propriete mecanique; Relation composition propriete; Etude experimentale; Membrane composite

CTES Membrana cambiadora anionica; Etileno polimero; Pirrol polimero;  
Procedimiento fabricacion; Polimerizacion oxidante; Polimerizacion fase heterogenea; Reaccion gas solido; In situ; Morfologia;  
Permeabilidad gas; Ultrafiltracion; Proteina; Transporte ionica; Numero transporte; Propiedad electrica; Propiedad mecanica; Relacion composicion propiedad; Estudio experimental

BT Transport properties

BTFR Propriete transport

BTES Propiedad transporte

L79 ANSWER 44 OF 67 PASCAL COPYRIGHT 2007 INIST-CNRS. ALL RIGHTS RESERVED. on STN

ACCESSION NUMBER: 1996-0326728 PASCAL Full-text

COPYRIGHT NOTICE: Copyright .COPYRGT. 1996 INIST-CNRS. All rights reserved.

TITLE (IN ENGLISH): • Ion conductivity and perselectivity measurements of polypyrrole membranes at variable states of oxidation

Electrochemistry of electroactive polymer films

AUTHOR: EHRENBECK C.; JUETTNER K.

TRIBOLLET Bernard (ed.); VOROTYNTSEV Mikhail (ed.)

CORPORATE SOURCE: Karl-Winnacker-Institut der DECHEMA e.V., Postfach  
150104, 60061 Frankfurt a.M., Germany, Federal  
Republic of  
UPR 15 du CNRS-LPLE, Universite P. et M. Curie,  
T22 5eme etage 4 place Jussieu, 75252 Paris,  
France

SOURCE: Electrochimica acta, (1996), 41(11-12),  
1815-1823, 53 refs.  
ISSN: 0013-4686 CODEN: ELCAAV

DOCUMENT TYPE: Journal

BIBLIOGRAPHIC LEVEL: Analytic

COUNTRY: United Kingdom

LANGUAGE: English

AVAILABILITY: INIST-1516, 354000044046620100

AN 1996-0326728 PASCAL Full-text

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AB Dc and ac measurements were carried out to study the ion conductivity and permselectivity of the **conducting polymer** polypyrrole in dependence of the oxidation state. Free-standing membranes were prepared by electropolymerization on a gold sputtered microporous polycarbonate foil which was mounted in a two-compartment measurement cell. The oxidation state of the ppy membrane was controlled potentiostatically by electron charge transfer in the asymmetrical configuration (gold layer/**membrane/electrolyte**), and the ion conductivity and permselectivity were studied separately in the symmetrical configuration (**electrolyte/membrane/electrolyte**) by combining constant current permeation experiments with IC and AAS solution analysis. It was found that polypyrrole exhibits an appreciable ion conductivity and anion permselectivity in the oxidized state. A membrane with distinct cation permselectivity in the reduced state can be prepared, when anionic groups are fixed in the polymer either by incorporation of immobile counterions (dodecylsulfate) or by copolymerization of a modified pyrrole monomer carrying a sulfonate group (N-sulfopropyl-pyrrole). Depending on the relative concentrations of the positive charges (ppy.sup.+) and the fixed negative charges (sulfonate groups) the copolymer membrane combines both anion and cation permselectivity. Since the concentration of ppy.sup.+ can be adjusted electrochemically by oxidation or reduction of the polymer backbone, such a membrane can be switched dynamically between both ion conducting states.

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CC 001C01H04C; Chemistry; General chemistry, Physical chemistry;  
Electrochemistry  
001D09B04; Applied sciences; Physicochemistry of polymers,  
Macromolecular chemistry, Materials science; Radiation action

CCFR 001C01H04C; Chimie; Chimie generale, Chimie physique; Electrochimie  
001D09B04; Sciences appliquees; Physicochimie des polymeres, Chimie  
macromoleculaire, Science des materiaux; Action des rayonnements

CCES 001C01H04C; Quimica; Quimica general, Fisicoquimica; Electroquimica  
001D09B04; Ciencias aplicadas; Fisicoquimica de los polimeros,  
Quimica macromolecular, Ciencia de los materiales; Accion de las  
radiaciones

CT Experimental study; **Porous** electrode; Polycarbonate;  
Modified material; Gold; Electrochemical polymerization;  
Electrochemical reaction; Pyrrole polymer; Pyrrole derivative  
copolymer; Sulfonate copolymer; Anionic surfactant; Polyelectrolyte;  
Ion exchange membrane; Electrical conductor; Ionic conductivity;  
Electrical impedance; Transport process; Ion transfer; Transport  
number; Potassium Chlorides; Sodium Sulfates; Lithium Perchlorates;  
Electrodialysis; Selective permeability; Operating conditions

CTFR Etude experimentale; Electrode poreuse; Carbonate polymere; Materiau  
modifie; Or; Polymerisation electrolytique; Reaction electrochimique;

Pyrrole polymere; Pyrrole derive copolymere; Sulfonate copolymere;  
 Agent surface anionique; Polyelectrolyte; Membrane echangouse ion;  
 Conducteur electrique; Conductivite ionique; Impedance electrique;  
 Phenomene transport; Transfert ion; Nombre transport; Potassium  
 Chlorure; Sodium Sulfate; Lithium Perchlorate; Electrodialyse;  
 Permeabilite selective; Condition operatoire; Sodium sulfate(lauryl)  
 CTES Estudio experimental; Electrodo **poroso**; Carbonato polimero;  
 Material modificado; Oro; Polimerizacion electrolitica; Reaccion  
 electroquimica; Pirrol polimero; Pirrol derivado copolimero;  
 Sulfonato copolimero; Agente superficie anionico; Polielectrolito;  
 Membrana cambiadora ionica; Conductor electrico; Conductividad  
 ionica; Impedancia electrica; Fenomeno transporte; Transferencia ion;  
 Numero transporte; Potasio Cloruro; Sodio Sulfato; Litio Perclorato;  
 Electrodialisis; Permeabilidad selectiva; Condicion operatoria  
 BT Transition metal  
 BTFR Metal transition  
 BTDE Uebergangsmetalle  
 BTES Metal transicion

L79 ANSWER 45 OF 67 JAPIO (C) 2007 JPO on STN  
 ACCESSION NUMBER: 2007-080558 JAPIO Full-text  
 TITLE: **ELECTROLYTE MEMBRANE AND  
 POLYMER ELECTROLYTE FUEL  
 CELL**  
 INVENTOR: EMORI HIDEYUKI; YAMAMOTO KAZUNARI  
 PATENT ASSIGNEE(S): NITTO DENKO CORP  
 PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2007080558	A	20070329	Heisei	

## APPLICATION INFORMATION

STN FORMAT: JP 2005-263491 20050912  
 ORIGINAL: JP2005263491 Heisei  
 PRIORITY APPLN. INFO.: JP 2005-263491 20050912  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2007

AN 2007-080558 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide an **electrolyte membrane** having high joining property with an electrode while **proton** conductivity and methanol penetration obstructing property are kept high, and hardly peeling off from the electrode even when a methanol aqueous solution which is fuel is made to flow, and to provide a polymer electrolyte **fuel cell** using the **electrolyte membrane**.

SOLUTION: The **electrolyte membrane** is formed by filling a third **polymer** having **proton conductivity** in fine pores in a **porous substrate** formed by crosslinking a resin composition containing a first polymer containing polyolefin having a weight average molecular weight of 500,000 or more, a second polymer having a reactive functional group and a weight average molecular weight of 2,000,000 or more, and a fourth polymer having a reactive functional group and a weight average molecular weight of less than 2,000,000. COPYRIGHT:

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IPCI H01M0008-02 [I,A]; H01M0008-10 [I,A]; H01B0001-06 [I,A]; C08J0009-42 [I,A]; C08L0023-00 [N,A];  
 H01M0008-02 [I,C\*]; H01M0008-10 [I,C\*]; H01B0001-06 [I,C\*];  
 C08J0009-00 [I,C\*]; C08L0023-00 [N,C\*]

L79 ANSWER 46 OF 67 JAPIO (C) 2007 JPO on STN  
 ACCESSION NUMBER: 2006-331848 JAPIO Full-text  
 TITLE: **PROTON CONDUCTIVE ELECTROLYTE**

09/936,148

MEMBRANE AND MANUFACTURING METHOD THEREOF,  
AND POLYMER ELECTROLYTE FUEL  
CELL

INVENTOR: SUZUKI TAKAYUKI; CHIBA TAKAHITO  
PATENT ASSIGNEE(S): KONICA MINOLTA HOLDINGS INC  
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2006331848	A	20061207	Heisei	

APPLICATION INFORMATION

STN FORMAT: JP 2005-153674 20050526  
ORIGINAL: JP2005153674 Heisei  
PRIORITY APPLN. INFO.: JP 2005-153674 20050526  
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
Applications, Vol. 2006

AN 2006-331848 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a **proton** conductive **electrolyte membrane** having fully high **proton** conductivity and fully low methanol permeability; and to provide a method for manufacturing the **proton** conductive **electrolyte membrane**, and a polymer electrolyte fuel cell using the **proton** conductive **electrolyte membrane**.

SOLUTION: The **proton** conductive **electrolyte membrane** allows a plurality of **proton** conductive **polymers** to be filled into the **pore** of a **porous** film while the plurality of filled **proton** conductive **polymers** have different compositions in the thickness direction of the membrane. The method is used to manufacture the **proton** conductive **electrolyte membrane**. The polymer **electrolyte fuel cell** uses the **proton** conductive **electrolyte membrane**. COPYRIGHT: (C)2007,JPO&INPIT

IPC1 H01M0008-02 [I,A]; H01B0001-06 [I,A]; H01B0013-00 [I,A]; H01M0008-10 [I,A]; H01M0008-06 [N,A];  
H01M0008-02 [I,C\*]; H01B0001-06 [I,C\*]; H01B0013-00 [I,C\*];  
H01M0008-10 [I,C\*]; H01M0008-06 [N,C\*]

L79 ANSWER 47 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2006-324133 JAPIO Full-text  
TITLE: **ELECTROLYTE MEMBRANE AND SOLID  
POLYMER FUEL CELL**

INVENTOR: YAMAMOTO KAZUNARI; SHO KINKO; EMORI HIDEYUKI  
PATENT ASSIGNEE(S): NITTO DENKO CORP  
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2006324133	A	20061130	Heisei	

APPLICATION INFORMATION

STN FORMAT: JP 2005-146564 20050519  
ORIGINAL: JP2005146564 Heisei  
PRIORITY APPLN. INFO.: JP 2005-146564 20050519  
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
Applications, Vol. 2006

AN 2006-324133 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide an **electrolyte membrane** capable of improving **proton** conductivity by optimizing the filling structure of a **proton** conductive **polymer**, and a solid polymer fuel cell using it.

SOLUTION: In this **electrolyte membrane** formed by filling the **proton** conductive **polymer** in the **pore** of a **porous** base material, the value of a positron annihilation lifetime  $\tau_3$  (ns) found by a positron annihilation method is  $\tau_3 < 2$ , and its relative intensity  $I_3$  (%) is  $I_3 < 9$ .

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IPCI H01M0008-02 [I,A]; C08J0005-22 [I,A]; C08J0009-42 [I,A]; H01B0001-06 [I,A]; H01M0008-10 [I,A]; C08L0023-00 [N,A];  
 H01M0008-02 [I,C\*]; C08J0005-20 [I,C\*]; C08J0009-00 [I,C\*];  
 H01B0001-06 [I,C\*]; H01M0008-10 [I,C\*]; C08L0023-00 [N,C\*]

L79 ANSWER 48 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2006-294323 JAPIO Full-text

TITLE: **PROTON CONDUCTIVE ELECTROLYTE  
 MEMBRANE, MANUFACTURING METHOD OF  
 PROTON CONDUCTIVE ELECTROLYTE  
 MEMBRANE, AND POLYMER ELECTROLYTE  
 FUEL CELL**

INVENTOR: SUZUKI TAKAYUKI; CHIBA TAKAHITO

PATENT ASSIGNEE(S): KONICA MINOLTA HOLDINGS INC

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2006294323	A	20061026	Heisei	

## APPLICATION INFORMATION

STN FORMAT: JP 2005-110663 20050407

ORIGINAL: JP2005110663 Heisei

PRIORITY APPLN. INFO.: JP 2005-110663 20050407

SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2006

AN 2006-294323 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a **proton** conductive **electrolyte membrane** having sufficiently high **proton** conductivity and sufficiently low methanol permeability, to provide the manufacturing method of the **proton** conductive **electrolyte membrane** having the high performance, and to provide a polymer electrolyte **fuel cell** having the **proton** conductive **electrolyte membrane** as an **electrolyte**. SOLUTION: The **proton** conductive electron membrane is manufactured by filling a **proton** conductive polymer in pores of an organic porous membrane containing inorganic particles. The **proton** conductive polymer is a polymer prepared by copolymerization or reaction of at least (a) a compound having one or more **proton** dissociative groups in a molecule and (b) a compound represented by general formula (1). COPYRIGHT: (C)2007,JPO&INPIT

IPCI H01M0008-02 [I,A]; H01B0001-06 [I,A]; H01B0013-00 [I,A]; H01M0008-10 [I,A];  
 H01M0008-02 [I,C\*]; H01B0001-06 [I,C\*]; H01B0013-00 [I,C\*];  
 H01M0008-10 [I,C\*]

L79 ANSWER 49 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2006-140098 JAPIO Full-text

TITLE: **PROTON CONDUCTOR, PROTON  
 EXCHANGE MEMBRANE, AND FUEL CELL**

INVENTOR: KOBAYASHI KOJI; TATSUMISAGO MASAHIRO; TADANAGA  
 KIYOHARU; HAYASHI AKITOSHI; NISHIYAMA TOSHIHIKO

PATENT ASSIGNEE(S): NEC TOKIN CORP

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2006140098	A	20060601	Heisei	

## APPLICATION INFORMATION

STN FORMAT: JP 2004-330628 20041115

ORIGINAL: JP2004330628 Heisei



09/936,148

PRIORITY APPLN. INFO.: JP 2004-330628 20041115  
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
Applications, Vol. 2006

AN 2006-140098 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a **proton** conductor having a high **proton** conductivity, a **proton** exchange membrane having a low methanol permeability, and a **fuel cell** using it.

SOLUTION: The **proton** conductor is composed of **proton** conductive **porous** ceramics which has a ceramic frame and a **proton** conductive functional group chemically bonded to the ceramic frame and has a periodic structure of **pores**. The **proton** exchange membrane has the **proton** conductor and a **polymer** component. The **fuel cell** uses the **proton** exchange membrane as an **electrolyte membrane**.

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IPCI H01M0008-02 [I,A]; H01B0001-06 [I,A]; H01M0008-10 [I,A];  
H01M0008-02 [I,C\*]; H01B0001-06 [I,C\*]; H01M0008-10 [I,C\*]

L79 ANSWER 50 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2006-140081 JAPIO Full-text

TITLE: **PROTON CONDUCTIVE ELECTROLYTE**  
**MEMBRANE AND MANUFACTURING METHOD THEREOF,**  
**AND POLYMER ELECTROLYTE FUEL**  
**CELL USING THE PROTON CONDUCTIVE**  
**ELECTROLYTE MEMBRANE**

INVENTOR: SUZUKI TAKAYUKI; CHIBA TAKAHITO

PATENT ASSIGNEE(S): KONICA MINOLTA HOLDINGS INC

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
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JP 2006140081	A	20060601	Heisei	
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#### APPLICATION INFORMATION

STN FORMAT: JP 2004-330200 20041115

ORIGINAL: JP2004330200 Heisei

PRIORITY APPLN. INFO.: JP 2004-330200 20041115

SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
Applications, Vol. 2006

AN 2006-140081 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a **proton** conductive **electrolyte membrane** that has full high **proton** conductivity and full low methanol permeability, to provide a method for manufacturing the **proton** conductive **electrolyte membrane**, and to provide a polymer electrolyte **fuel cell** that uses the **proton** conductive **electrolyte membrane**. SOLUTION: In the **proton** conductive **electrolyte membrane** where a **proton** conductive **polymer** is filled into the **pores** of an inorganic **porous** membrane, the **proton** conductive **polymer** is produced by copolymerizing a compound, having at least one sulfonic acid group and at least one ethylene unsaturated linkage in the molecule with a reactive emulsifier. COPYRIGHT: (C)2006,JPO&NCIPI

IPCI H01M0008-02 [I,A]; H01B0001-06 [I,A]; H01B0013-00 [I,A]; H01M0008-10  
[I,A];

H01M0008-02 [I,C\*]; H01B0001-06 [I,C\*]; H01B0013-00 [I,C\*];

H01M0008-10 [I,C\*]

L79 ANSWER 51 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2006-120510 JAPIO Full-text

TITLE: **ELECTROLYTE MEMBRANE AND**  
**POLYMER ELECTROLYTE FUEL**  
**CELL USING IT**

INVENTOR: EMORI HIDEYUKI; YAMAMOTO KAZUNARI

PATENT ASSIGNEE(S): NITTO DENKO CORP

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2006120510	A	20060511	Heisei	

## APPLICATION INFORMATION

STN FORMAT: JP 2004-308150 20041022  
 ORIGINAL: JP2004308150 Heisei  
 PRIORITY APPLN. INFO.: JP 2004-308150 20041022  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2006

AN 2006-120510 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide an **electrolyte membrane** having, in particular, high **proton** conductivity and methanol permeation prevention capability and a low methanol-swollen property; and to provide a polymer electrolyte **fuel cell** using it.

SOLUTION: In this **electrolyte membrane**, a third **polymer** having **proton conductivity** is filled in fine **pores** of a **porous base** material obtained from a resin composition containing 99-50 weight% of a first polymer containing polyolefins having a weight-average molecular weight not smaller than 500,000 as an essential constituent and one or more kinds selected from a group comprising a thermoplastic elastomer and a graft polymer as an arbitrary constituent and 1-50 weight% of a second polymer being a polymer wherein each double bond included in a main chain or a side chain is substituted with at least 1% of an epoxy group.

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IPCI H01M0008-02 [I,A]; H01B0001-06 [I,A]; H01M0008-10 [I,A];  
 H01M0008-02 [I,C\*]; H01B0001-06 [I,C\*]; H01M0008-10 [I,C\*]

L79 ANSWER 52 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2006-012527 JAPIO Full-text

TITLE: **PROTON CONDUCTIVE ELECTROLYTE MEMBRANE**, ITS MANUFACTURING METHOD, AND SOLID POLYMER **FUEL CELL** USING **PROTON CONDUCTIVE ELECTROLYTE MEMBRANE**

INVENTOR: SUZUKI TAKAYUKI; CHIBA TAKAHITO

PATENT ASSIGNEE(S): KONICA MINOLTA HOLDINGS INC

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2006012527	A	20060112	Heisei	

## APPLICATION INFORMATION

STN FORMAT: JP 2004-186208 20040624  
 ORIGINAL: JP2004186208 Heisei  
 PRIORITY APPLN. INFO.: JP 2004-186208 20040624  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2006

AN 2006-012527 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a **proton** conductive **electrolyte membrane** having sufficiently high **proton** conductivity and sufficiently low methanol permeability and its manufacturing method, and also to provide a solid polymer **fuel cell** using the **proton** conductive **electrolyte membrane**.

SOLUTION: The **proton** conductive **electrolyte membrane** is prepared by filling a **proton** conductive **polymer** in **pores** of an inorganic **porous** membrane, and the **proton** conductive **polymer** is prepared by copolymerizing a compound having one or more sulfonic groups and one or more ethylene unsaturated bonds in at least a molecule and a compound represented by the general formula (1).

COPYRIGHT: (C)2006,JPO&NCIPI  
 IPCI H01M0008-02 [I,A]; H01M0008-10 [I,A];  
 H01M0008-02 [I,C\*]; H01M0008-10 [I,C\*]

L79 ANSWER 53 OF 67 JAPIO (C) 2007 JPO on STN  
 ACCESSION NUMBER: 2005-317362 JAPIO Full-text  
 TITLE: MANUFACTURING METHOD OF **PROTON**  
**CONDUCTIVE POLYMER** MEMBRANE AND  
 SOLID POLYMER **FUEL CELL** USING  
 ABOVE  
 INVENTOR: YAMANE TOMOKAZU; KUROMATSU HIDETOSHI; MINAMIMURA  
 KIYOYUKI; MURAKAMI MUTSUAKI  
 PATENT ASSIGNEE(S): KANEKA CORP  
 PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2005317362	A	20051110	Heisei	H01M008-02

## APPLICATION INFORMATION

STN FORMAT: JP 2004-133992 20040428  
 ORIGINAL: JP2004133992 Heisei  
 PRIORITY APPLN. INFO.: JP 2004-133992 20040428  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2005

AN 2005-317362 JAPIO Full-text  
 AB PROBLEM TO BE SOLVED: To provide a manufacturing method of a polymer  
**electrolyte membrane** useful for a solid polymer **fuel cell** or a direct methanol  
**fuel cell** for stably and cheaply manufacturing a **proton conductive polymer**  
 membrane with a good property. SOLUTION: When a polymer film is sulfonated by  
 making it in contact with a sulfonating agent in an organic solvent, the  
 manufacturing method of the **proton conductive polymer** membrane has a feature  
 using a polymer film having **holes** on a polymer film surface. With this method,  
 not much of the sulfonating agent is necessary at time of sulfonation, and  
 high productive **proton conductive polymer** membranes are manufactured.

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IC ICM H01M008-02  
 ICS H01M008-10

L79 ANSWER 54 OF 67 JAPIO (C) 2007 JPO on STN  
 ACCESSION NUMBER: 2005-310485 JAPIO Full-text  
 TITLE: **ELECTROLYTE MEMBRANE** AND SOLID  
**POLYMER FUEL CELL**  
 INVENTOR: YAMAMOTO KAZUNARI; EMORI HIDEYUKI; YAMAGUCHI  
 TAKEHISA  
 PATENT ASSIGNEE(S): NITTO DENKO CORP  
 PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2005310485	A	20051104	Heisei	H01M008-02

## APPLICATION INFORMATION

STN FORMAT: JP 2004-124368 20040420  
 ORIGINAL: JP2004124368 Heisei  
 PRIORITY APPLN. INFO.: JP 2004-124368 20040420  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2005

AN 2005-310485 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide an **electrolyte membrane** capable of enhancing a methanol penetration preventing property and mechanical strength while **proton** conductivity is maintained in some degree even if the thickness is increased, to provide a solid polymer **fuel cell** using the **electrolyte membrane**, and to provide a direct methanol solid polymer **fuel cell** using the **electrolyte membrane**.

SOLUTION: The **electrolyte membrane** is prepared by filling a third **polymer** having **proton conductivity** in a pore of a laminated **porous substrate** formed by laminating a plurality of **porous** membranes formed by drawing and crosslinking a resin composition containing at least one kind of a first polymer selected from polyolefins and a second polymer having a reactive group. COPYRIGHT:

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IC ICM H01M008-02

ICS C08J009-00; C08L023-00; C08L101-02; H01B001-06; H01M008-10

L79 ANSWER 55 OF 67 JAPIO (C) 2007 JPO on STN  
 ACCESSION NUMBER: 2005-302694 JAPIO Full-text  
 TITLE: **FUEL CELL**  
 INVENTOR: NAGASAWA TOKU; ABE MASAO  
 PATENT ASSIGNEE(S): NITTO DENKO CORP  
 PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2005302694	A	20051027	Heisei	H01M004-86

#### APPLICATION INFORMATION

STN FORMAT: JP 2004-370644 20041222  
 ORIGINAL: JP2004370644 Heisei  
 PRIORITY APPLN. INFO.: JP 2004-76857 20040317  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2005

AN 2005-302694 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a solid polymer type **fuel cell** having an anode made to carry white gold/ruthenium alloy as an electrode catalyst, and capable of obtaining a high output suppressing poisoning of the electrode catalyst by carbon monoxide with using reformed hydrogen containing carbon monoxide as fuel to be supplied to the anode.

SOLUTION: The **fuel cell** arranging a cathode and an anode, pinching a **proton** conductive ion exchange **electrolyte membrane**, supplying oxygen to the cathode and supplying hydrogen containing carbon monoxide to the anode is such that the cathode is made to support an electrode catalyst layer containing white gold or white gold alloy and **proton** conductive ion exchange electrolyte **polymer** on a **conductive porous base** material, and the anode is made to support an conductive water retention layer with a thickness of 20&mu;m to 100&mu;m containing an **absorptive polymer** and **conductive** carbon powder on the conductive **porous base** material and an electrode catalyst layer containing white gold/ruthenium alloy and **proton** conductive ion exchange electrolyte **polymer** on the **conductive** water retention layer. COPYRIGHT: (C)2006,JPO&NCIPI

IC ICM H01M004-86

ICS H01M004-92

ICA H01M008-10

L79 ANSWER 56 OF 67 JAPIO (C) 2007 JPO on STN  
 ACCESSION NUMBER: 2005-285670 JAPIO Full-text  
 TITLE: MANUFACTURING METHOD OF FILM/ELECTRODE ASSEMBLY FOR POLYMER ELECTROLYTE TYPE **FUEL CELL**  
 INVENTOR: YONAMINE TAKESHI; TAKEBE YASUO; HORI YOSHIHIRO; YOSHIMURA MIKIKO; UCHIDA MAKOTO

PATENT ASSIGNEE(S): MATSUSHITA ELECTRIC IND CO LTD  
 PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2005285670	A	20051013	Heisei	H01M008-02

## APPLICATION INFORMATION

STN FORMAT: JP 2004-100797 20040330  
 ORIGINAL: JP2004100797 Heisei  
 PRIORITY APPLN. INFO.: JP 2004-100797 20040330  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2005

AN 2005-285670 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a manufacturing method of a membrane and electrode assembly in which a surface of catalyst supporting particles including micro **pores** of a catalyst layer is evenly and thinly coated with electrolyte without giving thermal and mechanical damage to a polymer **electrolyte membrane**, and which is superior in a balance of conductivity, **proton** conductivity, and gas dispersibility. SOLUTION: The manufacturing method of the polymer electrolyte type **fuel cell** membrane/electrode assembly includes a process (1) in which composite particles containing the catalyst carrying particles and a hydrogen ion **conductive polymer** electrolyte to cover at least a part of the catalyst carrying particles are mixed in a solvent and a dispersed liquid is obtained, and a process (2) in which the dispersed liquid is sprayed into the air, and while the solvent is partly vaporized, at least a part of the electrolyte is made to be half solid state, the composite particles are applied on the hydrogen ion **conductive polymer** film, and a catalyst layer is obtained constituted of composite particle layers.

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IC ICM H01M008-02

ICS H01M004-88

ICA H01M008-10

L79 ANSWER 57 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2005-285334 JAPIO Full-text

TITLE: **ELECTROLYTE MEMBRANE AND ITS MANUFACTURING METHOD**

INVENTOR: YAMAMOTO KAZUNARI; ABE MASAO; SHO KINKO; EMORI  
 HIDEYUKI; YAMAGUCHI TAKEHISA

PATENT ASSIGNEE(S): NITTO DENKO CORP

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2005285334	A	20051013	Heisei	H01B013-00

## APPLICATION INFORMATION

STN FORMAT: JP 2004-92619 20040326  
 ORIGINAL: JP2004092619 Heisei  
 PRIORITY APPLN. INFO.: JP 2004-56315 20040301  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2005

AN 2005-285334 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide an **electrolyte membrane** capable of improving **proton** conductivity and improving methanol permeation intercepting capacity by binding a sufficient amount of a **proton conductive polymer** with an intrapore **surface** of a **porous base** material by a simple method, to provide its manufacturing method, and to provide a polymer electrolyte **fuel cell** using it and a direct type methanol solid polymer **fuel cell**.

SOLUTION: This manufacturing method for the **electrolyte membrane** comprises a process filling a third polymer having the **proton** conductivity or a monomer which becomes the third polymer by polymerization in the **pores** of the **porous base** material containing at least one kind of first polymer selected from polyolefines and a second polymer having a double bond, then performing chemical bonding to the **pore surface** of the third polymer using the reactivity of the remaining double bond.

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IC ICM H01B013-00  
ICS C08J009-42; H01B001-06; H01M008-02; H01M008-10  
ICI C08L023:00

L79 ANSWER 58 OF 67 JAPIO (C) 2007 JPO on STN  
ACCESSION NUMBER: 2005-268106 JAPIO Full-text  
TITLE: **ELECTROLYTE MEMBRANE AND SOLID  
POLYMER FUEL CELL**  
INVENTOR: YAMAMOTO KAZUNARI; EMORI HIDEYUKI; YAMAGUCHI  
TAKEHISA  
PATENT ASSIGNEE(S): NITTO DENKO CORP  
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2005268106	A	20050929	Heisei	H01M008-02

#### APPLICATION INFORMATION

STN FORMAT: JP 2004-80584 20040319  
ORIGINAL: JP2004080584 Heisei  
PRIORITY APPLN. INFO.: JP 2004-80584 20040319  
SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
Applications, Vol. 2005

AN 2005-268106 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide an **electrolyte membrane** in which **proton** conductivity can be improved by adjusting a shrinkage stress ratio, a solid polymer **fuel cell** using it, and a direct type methanol solid polymer **fuel cell**.

SOLUTION: This is the **electrolyte membrane** in which a resin composition containing at least one kind of first polymers selected from a polyolefin group and a second polymer having a reactive group is cross-linked, and in which a third **polymer** having **proton conductivity** filled in a minute **hole** of a **porous base** material in which the shrinkage stress ratio MD/TD of a machine direction (MD) and the transverse direction (TD) is 0.4 to 2.5. COPYRIGHT: (C) 2005, JPO&NCIPI

IC ICM H01M008-02  
ICS H01B001-06; H01M008-10

L79 ANSWER 59 OF 67 JAPIO (C) 2007 JPO on STN  
ACCESSION NUMBER: 2005-149727 JAPIO Full-text  
TITLE: **MEMBRANE-ELECTRODE JUNCTION, MANUFACTURING METHOD  
OF THE SAME, AND DIRECT TYPE FUEL  
CELL USING THE SAME**  
INVENTOR: SHIMIZU KUNIHICO; NISHIYAMA TOSHIHIKO; MIZUKOSHI  
TAKASHI  
PATENT ASSIGNEE(S): NEC TOKIN CORP  
PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2005149727	A	20050609	Heisei	H01M008-02

## APPLICATION INFORMATION

STN FORMAT: JP 2003-380606 20031111  
 ORIGINAL: JP2003380606 Heisei  
 PRIORITY APPLN. INFO.: JP 2003-380606 20031111  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2005

AN 2005-149727 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a membrane-electrode junction having an **electrolyte membrane** excellent in **proton** conductivity and mechanical strength, well adhering to a catalyst electrode layer, in which, oxygen at an air electrode side and fuel at a fuel electrode side move easily, and also to provide a manufacturing method of the same, and a direct type **fuel cell** using the same.

SOLUTION: The direct type **fuel cell** uses the **electrolyte membrane** formed by applying: a hydrophilic material layer 3 on a fuel electrode side surface of the **electrolyte membrane** formed by **polymerizing proton conductive polymer** filling part 5 in a **porous** polymer 4; and a hydrophobic material layer 6 on an air electrode side surface of the **electrolyte membrane**.

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IC ICM H01M008-02  
 ICS H01M008-10

L79 ANSWER 60 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2004-247091 JAPIO Full-text

TITLE: **ELECTROLYTE MEMBRANE ELECTRODE**  
**JUNCTION BODY AND DIRECT METHANOL TYPE**  
**FUEL CELL**

INVENTOR: HIRAOKA HIDEKI; YAMAGUCHI TAKEHISA

PATENT ASSIGNEE(S): TOAGOSEI CO LTD

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2004247091	A	20040902	Heisei	H01M008-02

## APPLICATION INFORMATION

STN FORMAT: JP 2003-33747 20030212  
 ORIGINAL: JP2003033747 Heisei  
 PRIORITY APPLN. INFO.: JP 2003-33747 20030212  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2004

AN 2004-247091 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide an inexpensive, high output **fuel cell** in which the problem wherein operation cannot be made because of high current density in a direct methanol type **fuel cell** is solved and the problem of the permeation/swelling of fuel is canceled, and to provide an **electrolyte membrane** electrode junction body used for the **fuel cell**.

SOLUTION: In the **electrolyte membrane** electrode junction body, a fuel electrode (an anode) is set to be hydrophilic, an oxidizing agent electrode (a cathode) is set to be hydrophobic, and a foundation layer that has properties suitable for each electrode and is made of conductive powder and a binder is formed between the diffusion layer of the electrode and a catalyst layer. The direct methanol **fuel cell** incorporates a structure, where affinity to the water of the electrode is created according to each electrode and the **electrolyte membrane** is sandwiched, thus improving catalyst efficiency and increasing performance as compared with before. Additionally, a film, where the **pore** of a **porous base** material is filled with **polymer** having **proton conductivity**, is used instead of **polyperfluoroalkyle sulfonic acid-based electrolyte membrane** conventionally used for the **electrolyte membrane** for **fuel**

cells, thus further increasing the performance in the direct methanol **fuel cell**.

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IC ICM H01M008-02

ICS H01M004-86; H01M008-10

L79 ANSWER 61 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2004-146279 JAPIO Full-text

TITLE: **ELECTROLYTE MEMBRANE AND FUEL CELL USING THE ELECTROLYTE MEMBRANE**

INVENTOR: HIRAOKA HIDEKI; YAMAGUCHI TAKEHISA

PATENT ASSIGNEE(S): TOAGOSEI CO LTD

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2004146279	A	20040520	Heisei	H01M008-02

#### APPLICATION INFORMATION

STN FORMAT: JP 2002-311929 20021025

ORIGINAL: JP2002311929 Heisei

PRIORITY APPLN. INFO.: JP 2002-311929 20021025

SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2004

AN 2004-146279 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide an **electrolyte membrane** which has eliminated the problem of permeation/swelling due to methanol in the electrolyte for a **fuel cell** and which has a high productivity and is low in cost and superior in durability when operated as the **fuel cell**.

SOLUTION: This **electrolyte membrane** is made by filling a cross-linked **polymer** having **proton conductivity** in the **pores** of a **porous substrate**, and satisfies the following conditions. (1) The rate of area increase when dipped into pure water for one hour at 25&deg;C is 20% or less. (2) The cross-linked polymer is obtained by a mixture of a **protonic acid group** containing monomer or its salt and a cross-linker, and the ratio of the mol number of the **protonic acid group** containing monomer or its salt and the number obtained by multiplying the mol number of the cross-linker and the average number of functional group per one molecule of the cross-linking agent is 50:2 - 50:50. COPYRIGHT: (C)2004,JPO

IC ICM H01M008-02

ICS H01B001-06; H01M008-10

L79 ANSWER 62 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2003-282088 JAPIO Full-text

TITLE: **POLYMERELECTROLYTE TYPE FUEL CELL AND PRODUCTION PROCESS THEREOF**

INVENTOR: KOSAKO SHINYA; UCHIDA MAKOTO

PATENT ASSIGNEE(S): MATSUSHITA ELECTRIC IND CO LTD

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2003282088	A	20031003	Heisei	H01M008-02

#### APPLICATION INFORMATION

STN FORMAT: JP 2002-79127 20020320

ORIGINAL: JP2002079127 Heisei

PRIORITY APPLN. INFO.: JP 2002-79127 20020320

SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2003



AN 2003-282088 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a polymerelectrolyte type **fuel cell** free from occurrence of pin **holes** in a polymerelectrolyte membrane and short circuit and excellent in performance and reliability.

SOLUTION: For the polymerelectrolyte type **fuel cell** comprising a **proton conductive**

**polymerelectrolyte** membrane, a pair of electrodes composed of a catalyst layer and a gas diffusing layer and holding the electrolyte film between them, an anode-side conductive separator having a gas flow path, through which a fuel gas is supplied to a one electrode, and a cathode-side conductive separator having a gas flow path, through which an oxidizing gas is supplied to the other electrode, a means for preventing occurrence of pin **holes** in the **electrolyte membrane** is provided. COPYRIGHT: (C)2004,JPO

IC ICM H01M008-02

ICS H01M004-86; H01M008-10

L79 ANSWER 63 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2003-263998 JAPIO Full-text

TITLE: **ELECTROLYTE MEMBRANE AND SOLID POLYMER FUEL CELL** USING THE SAME

INVENTOR: YAMAGUCHI TAKEHISA; OYA NOBUO; NAKAO SHINICHI

PATENT ASSIGNEE(S): JAPAN SCIENCE & TECHNOLOGY CORP  
UBE IND LTD

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2003263998	A	20030919	Heisei	H01M008-02

#### APPLICATION INFORMATION

STN FORMAT: JP 2002-61917 20020307

ORIGINAL: JP2002061917 Heisei

PRIORITY APPLN. INFO.: JP 2002-61917 20020307

SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2003

AN 2003-263998 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide an **electrolyte membrane** which is superior in methanol permeation intercepting capacity (i), does not change in area or is reduced in area (iii), and is superior in **proton** conductivity (iv); and a **fuel cell** using the electrolyte, particularly a solid polymer **fuel cell**, and more specifically a direct type methanol solid polymer **fuel cell**. SOLUTION: The **electrolyte membrane** has a first **polymer** having **proton conductivity** filled in fine **holes** of a **porous base** material, and the **porous base** material includes a second polymer of at least one type selected from a group comprising a polyamide family and a polyimide family. COPYRIGHT: (C)2003,JPO

IC ICM H01M008-02

ICS C08J005-22; C08J009-26; H01B001-06; H01M008-10

ICI C08L079:08

L79 ANSWER 64 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2001-158806 JAPIO Full-text

TITLE: SULFONE GROUP-CONTAINING POLYVINYL ALCOHOL, SOLID POLYMER **ELECTROLYTE**, POLYMER CONJUGATED **MEMBRANE**, PRODUCTION METHOD THEREFOR AND ELECTRODE

INVENTOR: AKITA KOJI; ICHIKAWA MASAO; IGUCHI MASARU;  
KOYANAGI HIROYUKI

PATENT ASSIGNEE(S): HONDA MOTOR CO LTD

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2001158806	A	20010612	Heisei	C08F008-36

## APPLICATION INFORMATION

STN FORMAT: JP 2000-268736 20000905  
 ORIGINAL: JP2000268736 Heisei  
 PRIORITY APPLN. INFO.: JP 1999-265115 19990920  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2001

AN 2001-158806 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a solid polymeric electrolyte having **proton conductivity**, a **polymeric** composite membrane having excellent **proton** conductivity and methanol interruption, production thereof, and electrodes for **fuel cells** with excellent catalyst activity. SOLUTION: The objective sulfone group-containing poly(vinyl alcohol) having the crosslinking structures is produced by heat-treatment of a mixed solution of poly(vinyl alcohol), a sulfonation agent and a crosslinking agent. A water- **absorption** or hydrophilic polymer membrane is coated with the mixed solution, then sulfonated and crosslinked to give the objective polymeric composite membrane. Additionally, a sulfone group-bearing polyvinyl alcohol including the crosslinking structure and the electrodes including catalyst fine particles carried on **porous** particles are provided according to this invention.

COPYRIGHT: (C)2001,JPO

IC ICM C08F008-36

ICS B32B007-02; B32B027-30; C08J003-24; C08K005-41; C08L029-04;  
 H01M008-02; H01M008-10

L79 ANSWER 65 OF 67 JAPIO (C) 2007 JPO on STN

ACCESSION NUMBER: 2000-149965 JAPIO Full-text

TITLE: SOLID POLYMER **ELECTROLYTE**  
**MEMBRANE**

INVENTOR: OMICHI TAKAHIRO; KAWAGUCHI TAKEYUKI

PATENT ASSIGNEE(S): TEIJIN LTD

PATENT INFORMATION:

PATENT NO	KIND	DATE	ERA	MAIN IPC
JP 2000149965	A	20000530	Heisei	H01M008-02

## APPLICATION INFORMATION

STN FORMAT: JP 1998-320425 19981111  
 ORIGINAL: JP10320425 Heisei  
 PRIORITY APPLN. INFO.: JP 1998-320425 19981111  
 SOURCE: PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined  
 Applications, Vol. 2000

AN 2000-149965 JAPIO Full-text

AB PROBLEM TO BE SOLVED: To provide a solid polymer **electrolyte membrane** suitable for a **fuel cell** excellent in mechanical strength and heat resistance. SOLUTION: This solid polymer **electrolyte membrane** comprises a composite of a **porous** thin film having 300 g or more of film-penetrating strength and 300&deg;C of mechanical heat-resistance temperature in the film and a **proton-conductive polymer** electrolyte. A content of the **proton-conductive polymer** electrolyte in the solid polymer **electrolyte membrane** is 30-85 weight%, and the **porous** thin film is a high strength high-gas- **permeable porous** thin film supporting body having 50 &mu;m or less of average film thickness, 200 g or more of penetrating strength, and 10 sec/100 cc.in2 or less of gas-permeability. COPYRIGHT: (C)2000,JPO

IC ICM H01M008-02

ICS B32B005-18; C08J005-22

L79 ANSWER 66 OF 67 RAPRA COPYRIGHT 2007 RAPRA on STN

ACCESSION NUMBER: R:742167 RAPRA Full-text

FILE SEGMENT: Rapra Abstracts

TITLE: IONIC CONDUCTION IN POLYMER  
ELECTROLYTES/MICROPOROUS MEMBRANE  
COMPOSITES.AUTHOR: Korzhova N; Fisher S L; Le Granvalet-Mancini M;  
Teeters D

CORPORATE SOURCE: Tulsa, University; Nantes, University

SOURCE: ACS Polymeric Materials Science &  
Engineering. Volume 80. Conference proceedings  
Editor(s): ACS, Div. of Polymeric Materials Science  
& Engng.  
Anaheim, Ca., Spring 1999, p.618-9

PUBLICATION YEAR: 1999

DOCUMENT TYPE: Conference Article

LANGUAGE: English

AN R:742167 RAPRA Full-text

AB A wax-like solid electrolyte was complexed with lithium triflate and forced through various micro-porous membranes. The objective was to enhance ionic conductivity by: causing the interface between the micro-pores and the polymer electrolyte to mimic the conditions found in other filled polymer electrolyte systems; and creating a favourable alignment of the molecules. The electrical properties were determined by AC impedance measurements, and the membrane pores were investigated using atomic force microscopy. The ionic conductivity of the electrolyte material in an alumina membrane was enhanced compared with the pure electrolyte material. 16 refs.

AN R:742167 RAPRA FS Rapra Abstracts Full-text

CC 6M; 981

SC \*UI; QM

CT ALIGNMENT; ATOMIC FORCE MICROSCOPY; COMPOSITE; COMPOSITION;  
ELECTRICAL CONDUCTIVITY; ELECTRICAL PROPERTIES; ELECTROLYTE;  
EVALUATION; GRAPH; INSTITUTION; IONIC CONDUCTIVITY; MEMBRANE;  
PORE STRUCTURE; PROPERTIES; SOLID STATE; TECHNICAL; WAX

NPT ALUMINA; ALUMINIUM OXIDE; LITHIUM TRIFLATE

SHR ELECTROLYTES, ionic conductivity, composites, membranes; IONIC  
CONDUCTIVITY, electrolytes, composites, membranes  
; COMPOSITES, electrolytes, membranes, ionic  
conductivity; MEMBRANES, electrolytes, ionic  
conductivity, composites

GT EUROPEAN COMMUNITY; EUROPEAN UNION; FRANCE; USA; WESTERN EUROPE

L79 ANSWER 67 OF 67 RAPRA COPYRIGHT 2007 RAPRA on STN

ACCESSION NUMBER: R:699005 RAPRA Full-text

FILE SEGMENT: Rapra Abstracts

TITLE: INORGANIC MEMBRANES AS REDOX PHOTO- AND  
ELECTROCATALYSTS.AUTHOR: Amadelli R; Maldotti A; Carassiti V  
(Ferrara, Università)SOURCE: Chimica e l'industria 79, No.7, Sept.1997,  
p.885-91

PUBLICATION YEAR: 1997

DOCUMENT TYPE: Journal

LANGUAGE: English

AN R:699005 RAPRA Full-textAB Applications of inorganic compounds in combination with polymers in photo-  
and electroassisted catalytic redox membranes are reviewed. Systems examined  
include transport and separation membranes, semiconductors, biomimetic redox

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catalysts, metal/semiconductor/solid polymer **electrolyte membranes**, and gas-phase electrocatalysts based on metal/Nafion membranes. 38 refs.

AN R:699005 RAPRA FS Rapra Abstracts Full-text  
CC 6M  
SC \*QM  
CT ADDITIVE; BAND GAP; BIOCATALYST; BIOMEMBRANE; BIOMIMETIC; BUTYL METHACRYLATE COPOLYMER; CATALYST; CATALYTIC ACTIVITY; CHARGE CARRIER; **CONDUCTIVE POLYMER**; CROSSLINKING; DATA; ELECTRICAL CONDUCTIVITY; ELECTRICAL PROPERTIES; ELECTROCATALYSIS; ELECTROLYTE; ELECTRON TRANSFER; ENCAPSULATION; EXCITATION; EXCITED STATE; FILM; FILMS; GAS SEPARATION; GAS-PHASE; HETEROGENEITY; HETEROGENEOUS; HOST-GUEST; IMMOBILISATION; IMMOBILIZATION; INCLUSION; INORGANIC; INSTITUTION; ION EXCHANGE RESIN; IONIC CONDUCTIVITY; LIQUID CRYSTAL DISPLAY; MEMBRANE; MEMBRANE SEPARATION; MICROENCAPSULATION; MICROHETEROGENEOUS; MICROPOROUS; MOLECULAR MOTION; OCTYL METHACRYLATE COPOLYMER; OPTICAL PROPERTIES; PHOSPHAZENE POLYMER; PHOTOCATALYST; PHOTOCHEMISTRY; PHOTOEXCITATION; PHOTOSYNTHESIS; PIGMENT; PLASTIC; POLYELECTROLYTE; POLYMERIC CATALYST; POLYPHOSPHAZENE; POLYPYRROLE; POLYSTYRENE; POLYTHIOPHENE; POLYURETHANE; POLYVINYL TRIMETHYLSILANE; POROSITY; **POROUS**; PROPERTIES; PROTEIN; PS; PU; PYRROLE POLYMER; REDOX CATALYST; SEMICONDUCTOR; SEPARATION MEMBRANE; SOL-GEL; SOLVENT; SULFONYL FLUORIDE VINYL ETHER COPOLYMER; SULPHONYL FLUORIDE VINYL ETHER COPOLYMER; SWELLING; TECHNICAL; TETRAFLUOROETHYLENE COPOLYMER; THERMOPLASTIC; THIOPHENE POLYMER; TRADE NAME; TRANSPORT PROPERTIES; VAPOUR-PHASE; VESICLE; VINYL IMIDAZOLE COPOLYMER  
NPT CYCLODEXTRIN; CYCLODEXTRINS; METAL; PORPHYRIN; TITANIA; TITANIUM; TITANIUM DIOXIDE  
SHR MEMBRANES, plastics; POLYMERIC CATALYSTS, plastics  
GT EUROPEAN COMMUNITY; EUROPEAN UNION; ITALY; WESTERN EUROPE  
TN NAFION

=> => d his nofile

(FILE 'HOME' ENTERED AT 07:51:04 ON 26 JUL 2007)

FILE 'HCAPLUS' ENTERED AT 07:52:18 ON 26 JUL 2007

L1 1 SEA ABB=ON PLU=ON WO2000-JP01370/PN,PRN,AP  
E WO2000-JP01370/PN,PRN,AP  
L2 13396 SEA ABB=ON PLU=ON ELECTROLYT?(2A)MEMBRAN?  
E FUEL CELL ELECTROLYTES/CT  
L3 5291 SEA ABB=ON PLU=ON "FUEL CELL ELECTROLYTES"+PFT,NT,OLD,NEW  
/CT  
L4 1897 SEA ABB=ON PLU=ON L2 AND L3  
L5 QUE ABB=ON PLU=ON PORE# OR POROUS# OR PERMEABL? OR HOLE#  
OR SPONG# OR ABSORP? OR POROS#  
L6 363 SEA ABB=ON PLU=ON L4 AND L5  
L7 73 SEA ABB=ON PLU=ON L6 AND CONDUCT? (2A) (POLYMER? OR GRAFT  
POLYMER? OR COPOLYMER? OR CO(A)POLYMER? OR BLOCK POLYMER?  
OR BLOCKPOLYMER? OR GRAFTPOLYMER?)  
L8 51 SEA ABB=ON PLU=ON L7 AND PROTON?  
L9 34 SEA ABB=ON PLU=ON L8 AND DEV/RL  
L10 8 SEA ABB=ON PLU=ON L9 AND (1840-2000)/PRY,AY,PY  
L11 16 SEA ABB=ON PLU=ON L7 AND (1840-2000)/PRY,AY,PY  
L12 16 SEA ABB=ON PLU=ON L10 OR L11  
L13 1 SEA ABB=ON PLU=ON L12 AND L1  
L14 17960 SEA ABB=ON PLU=ON L5(3A)SUBSTRAT?  
L15 85 SEA ABB=ON PLU=ON L14 AND L4  
L16 QUE ABB=ON PLU=ON CONDUCT? (2A) (POLYMER? OR GRAFT  
POLYMER? OR COPOLYMER? OR CO(A)POLYMER? OR BLOCK POLYMER?

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OR BLOCKPOLYMER? OR GRAFTPOLYMER?)  
L17 28 SEA ABB=ON PLU=ON L15 AND L16  
L18 6 SEA ABB=ON PLU=ON L17 AND (1840-2000)/PRY,AY,PY  
L19 16 SEA ABB=ON PLU=ON L12 OR L18  
L20 42 SEA ABB=ON PLU=ON L15 AND PROTON#  
L21 5 SEA ABB=ON PLU=ON L20 AND (1840-2000)/PRY,AY,PY  
L22 17 SEA ABB=ON PLU=ON L19 OR L21  
L23 2552 SEA ABB=ON PLU=ON L2 AND CATHOD# AND ANOD#  
L24 44 SEA ABB=ON PLU=ON L23 AND L5(2A)(SUBSTRAT? OR BASE# OR  
SURFAC? OR SUBSTRUCT? OR UNDERSTRUCT? OR UNDERLAY? OR  
FOUNDATION? OR PANE?)  
L25 24 SEA ABB=ON PLU=ON L24 AND ?POLYMER?  
L26 0 SEA ABB=ON PLU=ON L24 AND HEAT(A)RESIST?(2A)POLYMER?  
L27 7 SEA ABB=ON PLU=ON L25 AND (1840-2000)/PRY,AY,PY  
L28 23 SEA ABB=ON PLU=ON L22 OR L27

FILE 'WPIX' ENTERED AT 08:52:09 ON 26 JUL 2007

L29 4123 SEA ABB=ON PLU=ON ELECTROLYT?(2A)MEMBRAN?  
L30 62 SEA ABB=ON PLU=ON L23 AND L5(2A)(SUBSTRAT? OR BASE# OR  
SURFAC? OR SUBSTRUCT? OR UNDERSTRUCT? OR UNDERLAY? OR  
FOUNDATION? OR PANE?)  
L31 62 SEA ABB=ON PLU=ON L30 AND L29  
L32 16308 SEA ABB=ON PLU=ON CONDUCT? (2A)(POLYMER? OR GRAFT  
POLYMER? OR COPOLYMER? OR CO(A)POLYMER? OR BLOCK POLYMER?  
OR BLOCKPOLYMER? OR GRAFTPOLYMER?)  
L33 5 SEA ABB=ON PLU=ON L32 AND L31  
L34 1303 SEA ABB=ON PLU=ON L29 AND L5  
L35 117 SEA ABB=ON PLU=ON L34 AND L32  
L36 50 SEA ABB=ON PLU=ON L35 AND (CATHOD# OR ANOD# OR ELCTROD#)  
L37 47 SEA ABB=ON PLU=ON L36 AND FUEL CELL#  
L38 QUE ABB=ON PLU=ON L5(2A)(SUBSTRAT? OR BASE# OR SURFAC?  
OR SUBSTRUCT? OR UNDERSTRUCT? OR UNDERLAY? OR FOUNDATION?  
OR PANE?)  
L39 5 SEA ABB=ON PLU=ON L37 AND L38  
L40 31 SEA ABB=ON PLU=ON L37 AND PROTON?  
L41 1 SEA ABB=ON PLU=ON L40 AND HEAT(A)RESIST?  
L42 1 SEA ABB=ON PLU=ON L40 AND INORGANIC SUBS?  
L43 0 SEA ABB=ON PLU=ON L40 AND GRAFT POLYMER?  
L44 34 SEA ABB=ON PLU=ON L33 OR L39 OR L40 OR (L41 OR L42 OR  
L43)  
L45 7 SEA ABB=ON PLU=ON L44 AND (PY<2000 OR AY<2000 OR  
PRY<2000)  
L46 502 SEA ABB=ON PLU=ON ELECTROLYT?(2A)MEMBER?  
L47 4 SEA ABB=ON PLU=ON L46 AND L14  
L48 2 SEA ABB=ON PLU=ON L47 AND (PY<2000 OR AY<2000 OR  
PRY<2000)  
L49 9 SEA ABB=ON PLU=ON L45 OR L48  
L50 341 SEA ABB=ON PLU=ON (L29 OR L46) AND L32  
L51 19 SEA ABB=ON PLU=ON L50 AND L38  
L52 7 SEA ABB=ON PLU=ON L51 AND (PY<2000 OR AY<2000 OR  
PRY<2000)  
L53 15 SEA ABB=ON PLU=ON L52 OR L49

FILE 'COMPENDEX' ENTERED AT 09:36:45 ON 26 JUL 2007

L54 144 SEA ABB=ON PLU=ON (L29 OR L46) AND L32  
L55 5 SEA ABB=ON PLU=ON L54 AND L38  
L56 0 SEA ABB=ON PLU=ON L55 AND (PY<2000 OR AY<2000 OR  
PRY<2000)  
L57 23 SEA ABB=ON PLU=ON L54 AND L5  
L58 23 SEA ABB=ON PLU=ON L57 AND L16

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L59           4 SEA ABB=ON   PLU=ON   L58 AND (PY<2000 OR AY<2000 OR  
              PRY<2000)  
L60           4 SEA ABB=ON   PLU=ON   L56 OR L59

FILE 'PASCAL' ENTERED AT 09:44:02 ON 26 JUL 2007

L61           4 SEA ABB=ON   PLU=ON   L54 AND L38  
L62           14 SEA ABB=ON   PLU=ON   L54 AND L5  
L63           6 SEA ABB=ON   PLU=ON   (L61 OR L62) AND (PY<2000 OR AY<2000  
              OR PRY<2000)  
L64           2 SEA ABB=ON   PLU=ON   L63 AND PROTON?  
L65           6 SEA ABB=ON   PLU=ON   L63 OR L64

FILE 'DISSABS' ENTERED AT 09:51:32 ON 26 JUL 2007

L66           0 SEA ABB=ON   PLU=ON   L54 AND L38  
L67           1 SEA ABB=ON   PLU=ON   L54 AND L5

FILE 'JAPIO' ENTERED AT 09:52:13 ON 26 JUL 2007

L68           13 SEA ABB=ON   PLU=ON   L54 AND L38  
L69           34 SEA ABB=ON   PLU=ON   L54 AND L5  
L70           34 SEA ABB=ON   PLU=ON   L68 OR L69  
L71           7 SEA ABB=ON   PLU=ON   L70 AND (CATHOD# OR ANOD# OR ELCTROD#)  
L72           34 SEA ABB=ON   PLU=ON   L70 OR L71 AND (PY<2000 OR AY<2000 OR  
              PRY<2000)  
L73           23 SEA ABB=ON   PLU=ON   L72 AND PROTON?  
L74           21 SEA ABB=ON   PLU=ON   L73 AND FUEL CELL#

FILE 'RAPRA' ENTERED AT 10:41:33 ON 26 JUL 2007

L75           1 SEA ABB=ON   PLU=ON   L54 AND L38  
L76           17 SEA ABB=ON   PLU=ON   L54 AND L5  
L77           17 SEA ABB=ON   PLU=ON   L75 OR L76  
L78           2 SEA ABB=ON   PLU=ON   L77 AND (PY<2000 OR AY<2000 OR  
              PRY<2000)

FILE 'HCAPLUS, WPIX, COMPENDEX, PASCAL, JAPIO, RAPRA' ENTERED AT  
10:43:58 ON 26 JUL 2007

L79           67 DUP REM L28 L53 L60 L65 L74 L78 (4 DUPLICATES REMOVED)  
              ANSWERS '1-23' FROM FILE HCAPLUS  
              ANSWERS '24-36' FROM FILE WPIX  
              ANSWERS '37-40' FROM FILE COMPENDEX  
              ANSWERS '41-44' FROM FILE PASCAL  
              ANSWERS '45-65' FROM FILE JAPIO  
              ANSWERS '66-67' FROM FILE RAPRA